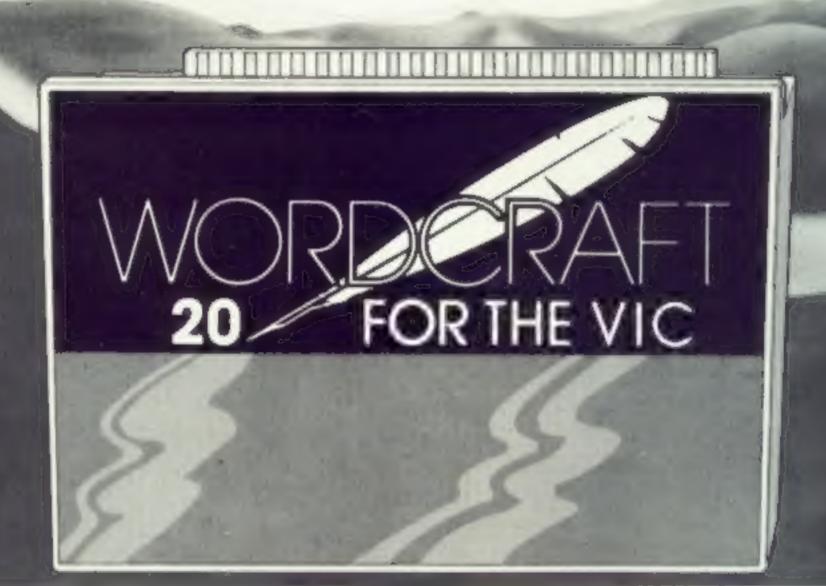


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VOLUME 3 NUMBER 10

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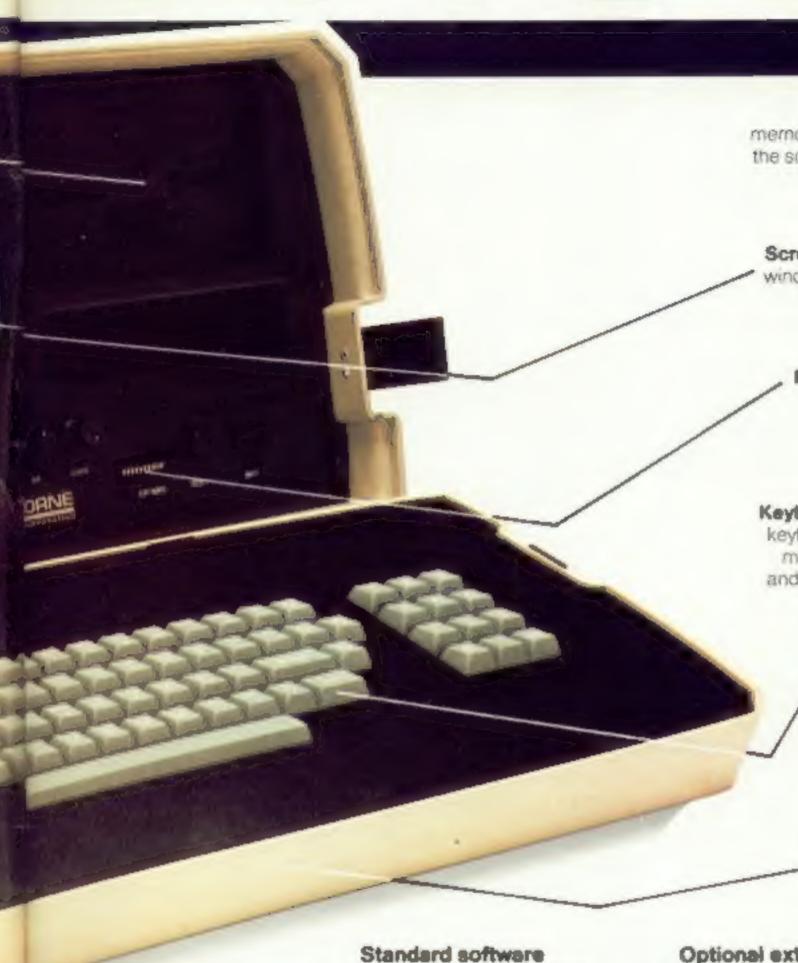
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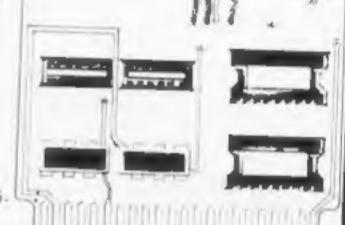
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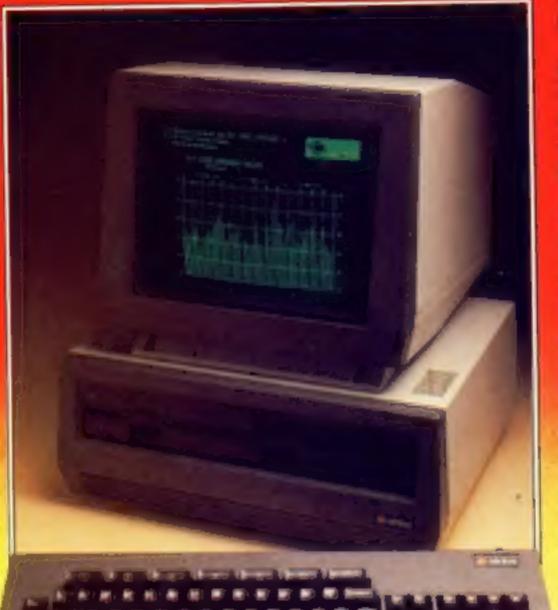
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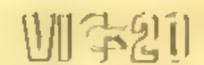
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Information Technology '82 has done a great deal to convince ordinary people that they need to know about computers. Yet few people can actually define what a computer is. In the first of our series of explanations for absolute beginners, **Richard Pawson** compares the computer with a food mixer.

What is a computer, anyway?

A computer like any other kind of machine, is really a processor – that is to say you feed something in, the machine performs a process on it and gives you something else out. Let's look at the example of a domestic food mixer. The most soph sticated models on the market which can chop, grate, slice, as well as mix, are even called Food. Processors. Were you to set the controls correctly, you could feed in some carrots, white cabbage, onion and mayonnaise (let's call this our *input*) and the lood processor gives you back ready-made coleslaw – the *output*.

Though some computers appear to deal with physical quantities (such as the computers which control huge coaffired power stations, or the robots which built Japanese cars), what all computers are really processing is information, but with many different ways of gathering the nput data and issuing the output data.

In the power station, for example, the computer gathers its information about furnace temperature, power

production and cooling water flow from a number of sensors in just the same way as the eyes, nose and ears feed input information to the brain. Some calculations are performed and the resulting data fed to a valve on the fuel hopper which controls the rate at which coal is fed in

An example of a computer processing pure information is the typical desktop business micro. Information is fed in usually via the keyboard, perhaps in the form of sales orders, or figures from clock cards. This same information is then processed, combined with data that has been typed in previously and stored, and output in a different form – say invoices or Pay SI ps.

Fast and reliable

Great, I can hear you saying, so why use a computer just to change figures from one form to another? Well, sometimes the advantage is speed. Engineers have to perform calculations that involve perhaps a million multiplications and three million additions – which even on a sophisticated calculator could take months if not years. Computers are also more reliable and can work continuously without breaks, which is obviously essential in our power station.

In most situations the same raw data is used to produce different results. In a typical business, information from sales orders can be processed to tell the Marketing Manager which regions are seiling best, the Credit Control department how much money is owed, and the warehouse which product lines need re-ordering. By using a computer once an item of information has been typed in, it is stored or memorised and can be used in future calculations without the need for retyping.

But the area in which computers really score over their human counterparts is in repetitive processes or calculations. If you start to think about it, an awful lot of the

processes we perform are repetitive. Sometimes simple ke adding VAT to an invoice, sometimes complex like extracting a statistical trend from some scientific data. Once a computer has been shown how to perform a process, it can repeat the technique ad infinitum – using different information as input, and hence different output each time.

Telling the computer how to perform a process the first time is called *programming*. Programming is needed because computers aren't reality very clever and can only do straightforward things I ke adding two numbers together Programming simply involves breaking down your application into successively smaller tasks or operations until each one can be understood and performed by the computer.

Set of instructions

The resulting list of operations or simple tasks is consquently called the program. In this respect a computer program is no different from a recipe, knitting pattern, or set of instructions for assembling a kitchen cabinet. Like all the above, a computer program is written in a special kind of anguage or jargon consisting of many abbreviations, strange symbols and phrases. Which makes it all the more surprising that people who can fluently read the complex coding of a knitting pattern believe they can't get to grips with computer programming.

The language in which programs are written (there are several anguages e.g. FORTRAN, COBOL and PASCAL though BASIC is the most commonly used in micros) has been designed to assist you, the user. First it saves space by getting you to define operations in a concise form.

TOTAL = PARTS + LABOUR

is obviously quicker than saying

Add the values of PARTS and LABOUR and then place the result in TOTAL

Secondly, the programming language encourages you to be precise defining what you want to do in a manner that can tibe interpreted ambiguously.

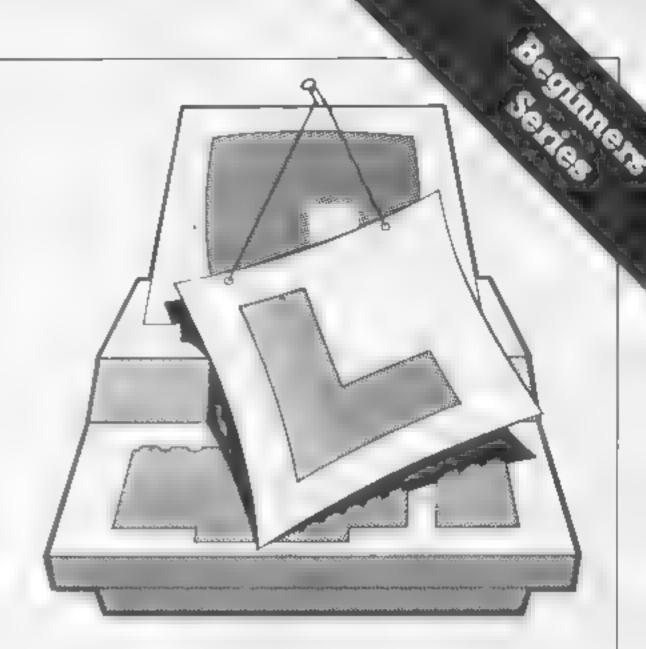
The main function of a programming language is to provide you with tools for performing the most common asks. It has already been stated that the Centra. Processing Unit of a computer is very dumb most can the even perform a multiplication function. The programming anguage provides you with such a function (plus many more advanced features) and every time this is invoked, the language translates the multiplication into hundreds of simple additions which the computer understands. Though you don't see any of this happening.

Arting the program in a more sophisticated language, the higher the level of a language, the closer it is to plain English), not only saves time, but makes the list of instructions easier to read, and helps avoid mistakes by eliminating the need for hundreds of statements to perform even a simple task.

Summary

So what have we learnt in the first installment? Here's a quick summary -

- 1 A computer processes information. It takes in data in one form (INPUT) performs calculations on that data and feeds it out in another form (OUTPUT)
- The list of instructions that tell the computer how to perform a particular process is called a program. Once



programmed a computer can repeat the same process on different data very quickly

3 Programming is a mply the technique of breaking down your application into small chunks which the computer can understand. These individual instructions are expressed in a programming language which provides tools for all the most common tasks. This language is translated automatically by the computer into a very long list of uitra simple commands which its Central Processing Unit can follow.

Next month we shall be looking at the different parts that make up a typical computer system, and what role each plays in processing information.



"... all computers are really processing information, but with many different ways of gathering the input data and issuing the output data"

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WORD PROCESSING

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. . . and this is just the tip of the iceberg! The following program generators are Pierse forward de tenis on the Drog and sentential as Indicated available for the microcomputer systems indicated -C.O.R.P. and Techwriter for the Apple II Codewriter for the CBM PET 8000 series, TRS 80 III, Sirius and IBM PC Techwriter for the Apple III and CP/M ... with more to come C.O.R.P., Codewriter, Techwriter Apple CBM Pet TRS. Sirius, IBM, CP/M are registered trademarks.



For further information on any of these program generators, complete and cut out the coupon and post to:

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READ/WIRE

Big deal

I note that several printer retailers are offening quite large price reductions on printers if more than one are bought. Discom, for instance, offer the Smith-Corona TP-1 Text printer at £485 for one; £395 for two; £340 for 50.

Wouldn't it be a good idea if some micro users got together and formed a kind of bulk buy co-operative? I d be happy to join one

> T M Artingstoll Zwoller, The Netherlands

Excellent ideal That is precisely how some dealers started life. MicroComputer Printout wholeheartedly supports the idea of a computer-users co-operative — and we would certainly give publicity to anyone willing to start one.

De Re Atari

Further to my earlier letter concerning the whereabouts of the Atari manual 'De Re Atari' I am able to give a U.K. Distributor's address

Details of nearest retailers are available from

Atari U K WEA Records. London W1V 2BH

or contact

Maplin Electronic Supplies. P.O. Box 3.

Rayleigh, Essex SS6 8LR who have some copies of the manual

If you could print these addresses as an update of the earlier U.S. address (sent.) am sure they will be well received.

N Crozier, Malton, N Yorkshire

Rogues Gallery

Your contributors range from the sublime (Tommy, Terry Hope) to the ridiculous (Richard Nicols, Inside Trader) What about brief biographies of this bizarre crew?

Harvey Smith (not '2 fingers' Harvey) Halifax

Unfortunately, this letter went right round the office before the idea could be suitably squashed. Even before the Editor could get started on Volume Thirteen of his memoires, his desk was knee deep in submitted articles along the lines.

'A day in the life of Lindsay Doyle
'Terry Hope -- the early years
Mein Kampf' -- Tornmy

'Pubs I have known' - Martin 'Legless' Banks

Expect some suitably silly excerpts in forthcoming issues.

Male Chauvinism (part I)

Re "User Friendliness"

I should like to express my distate with re-

gard to the above-mentioned article by Chris Preston, appearing in your August 1982 issue. I take exception not to Mr. Preston's points concerning the evaluation of user friendliness in micro computers, but rather to the manner in which these points were made His crude generalisations regarding the nature of female computer operators (whom he characterises either as mindless school leavers or "slightly dotty old matrons, from 40 up to 60+"), the level of their skills and commitment to their jobs, were both offensive and unnecessary in the context of the subject of the article Surely It is possible to reserach, write and edit an article such as this without denigrating women and the role they play in operating business computers. I strongly suggest that if Mr. Presion is not capable of so doing, and his work makes it glanngly obvious that he is not, then a woman author might have been a better choice for this assignment

> Keisey Sterling Oadby Leics

Surety you don't think that this magazine s initials are M.C.P. by coincidence, Ms. Sterling?

We re sure that Chris intended no offence in his comments about female computer operators – indeed, he is extremely fond of several. But when you have spent as many years as he has designing "loot proof" programs and watching people make seemingly impossible blunders, you are bound to end up with a rather cynical outlook.

We would positively invite more contributions from our fairer-sexed readers (that's women you pais!). They should write in confidence to the Editor, marking the envelope personal and confidential Male chauvinism (part II)

Last month's headlines in the Hotline news section ['Net Stockings, 'Debugger Off] were a blatent example of male chauvenism

eithst pornography and rampant sexism table fascist opportunist rubbish ... press bias degrading women and gays , exploitation of women. Your columnist should be castrated.

Grinda Glotz Women against Sex and Violence in

the Media Stoke Newington

This letter has been edifted to remove the sex and violence

Cheap Monitor

With reference to S. Macenzie's letter in your August issue yes is is possible to convert a portable TV set to monitor use, further the conversion is cheap and easy. However, the tollowing rules must be obeyed.

1 The TV must have an solated chassis 2 The mains lead must be three core with the chassis permanantly earthed (i.e. replace two core mains leads)

Having done that all that is necessary is to wire a resistor to turn off the fina. Vision IF transistor, and to feed the video signal into the base of the first video amplifier, ensuring that signals to the sync separator remain intact. Bandwith should be OK for a ZXB1 but could be increased by increasing stages and decreasing stage gain in the video amplifier.

If none of this makes any sense take the set and this letter to your friendly local TV re-

I have done this myself to a cheap ingersor



BEAD/WIRE

The Editor welcomes your letters, but if you require a personal reply please enclose an S.A.E.

TV and now have a £45 monitor which will resolve 80X32 text from a BBC micro

G Cox.

How many times must we warn readers not to contradict the advice given out by our bothns — they can act in a most unpredictable manner! (Mr. Cox's address has been without in the interests of his continued good health)

Bugs squashed

I have just read the letter from G. Mayer in the July issue of MicroComputer Printout BEEBUG is currently investigating his claims about appointed dealers, but I can confirm that some are indeed taking such an attitude We will report in future issues of our newsletter.

Secondly, in your reply at the end of the letter you state that owners of BBC Micros should join one of the 'Independent' user groups such as BEEBUG or Laserbug May I state categorically that as far as I know the only truly independent user group is BEEBUG Laserbug are run by a shop called 'Computers for Ait', and cannot represent their members in a truly independent way. For example they recommend to their members that to convert BBC machines from 16K to 32K that they buy the chips from them at over twice the price that BEEBUG has negotiated, thus costing their trusting members an extra £20 or so!

Sheridan Will ams. St Albans, Herts

We invite Laserbug to reply, defending their case

Ex-editor gets fuzzy

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We have always maintained that PCW was difficult to understand, now we know why - their ex-editor (D D T himself) has difficulty in getting to grips with plain ordinary English!

For those not blessed with an IQ of 280 (or Bob Chappell's Fuzzy Matching program).

DDT is pointing out some errors in the article and listing. Corrections are as follows.

Line 180: N and M should be set to the value of Thy e 130

Text: N\$() First minor element holds the original name, second minor element holds the soundex coded name.

Bob advises us that these do not affect the tunning of the program and are merely skeletons' left over from the development stage.

A leg to stand on

Our attention has been drawn to references in your issues dated April, May, June, July and August 1982 to Martin 'Legless' Banks

We act for Mr Banks who states that he is neither an ampulee nor air inebriate. To suggest otherwise is to cast a most damaging stur on the reputation of a distinguished journalist.

Unless an immediate retraction and a full apology is published in your next issue and appropriate compensation paid, we shall have no alternative but to advise Mr Banks of the legal remedies open to him.

Yours faithfully Slocumbe & Payne, Solicitors

We are happy to state that Mr Banks is one of the most sober journalists we know, we have sent him a bottle of Scotch by way of recompense

Quality of life

Congratulations on publishing a machine code program for LIFE on the ZX81. This is the first program for the ZX81 where you could set up the initial pattern that I have seen and gave much better results than the programs with 'random' start patterns. I've had LIFE running on my school's RML 380Z for a number of months now and found the following patterns give very worthwhile results on the ZX81. (Once the correct BASIC routine had been worked out and added to the published listing.)

Firstly a simple line of five '0's quickly becomes an alternating pattern called 'Traffic Lights', with a "life cycle" of two. That is, only two patterns are formed before they repeat Seven '0's in a line becomes a stable pattern of hexagons called 'Honey Farm'. Ten '0's forms the 'Pentadecathalon' with a life cycle of lifteen.

A more complex pattern is called Turnbler', formed from this initial pattern

This pattern inverts itself every seven generations and thus has a life cycle of fourteen

One of the simplest looking, but really very complex patterns, is called 'R-pentomino'

This is the starting pattern

00 00 0

Given sufficient room to expand this pattern lasts 1102 generations. The ZX81's screen is not large enough, however, to support the largest pattern generated so the pattern does not evolve to the full 1102 generations. Though several griders' are fired out as the pattern evolves.

Another pattern, simply called Pattern, becomes stable after 173 generations. This is its starting pattern.

Finally, two simpler patterns. This first is called 'Spaceship and this moves her zontally across the screen

The last pattern is three five dot, dashes This gives a very attractive display but again eventually overtuns the ZX81's screen

00000 00000 00000

The prothern of screen size is one thope to solve when my BBC micro eventually arrives. Ed – See Mr Steen's letter below for explanation of the word "eventually"

Calum Steen Heiensburgh

Soap opera

Now that the What IS happening at Atari?', Now it can be told' saga is over may I suggest that 'Hot me turns to attention to the problems with the BBC micro. After having waited for ten weeks to be told not to expect delivery until mid-August, I feel that Acorn/BBC are funning the kind of operation that would make even Clive Sinclair blush. The microcomputer market in Britain may be only five years old but I would have thought that it was past the stage where a subcontractor to a major organisation can go into receivership, as seems to have happened to Cleartone.

One is very much over a berret in this situation and it appears that the suppliers are quite happy to exploit this. To cancel the order means losing the computer entirely and why should the makers care when there are plenty of other eager customers.

Until the rush by the makers of these new micros to announce better and cheaper models is over, it seems that it is the buyer who must think twice before turning away from the tried and trusted models if I had the money than I wouldn't hesitate to buy an Apple II rather than finance a system that



computer hardware

Without it we'd still be in the world of Flash Gordon and mad professors.

Luckily, we have got the micro chip and the computer is now an everyday part of business life

So, it seems odd that we should have to wait until now for a similar breakthrough in the world of computer software

Still, it's been worth the wait

PlannerCalc, the new * CP/M spreadsheet business planner from Comshare, is the first in a series of powerful packages that are going to put all others in the shade

And, what's more, at £39.00 (plus VAT and p. & p.) it makes other people's price tags look a little extravagant

PlannerCalc can handle the kind of business planning applications that fit into the spreadsheet format

And unlike all other 'calc' products it allows you to enter calculation rules in English

It uses the popular'spreadsheet'approach, with a window that can be rolled in all directions.

Which means you can enter new figures or rules and immediately see their effects on everything else in the model

PlannerCalc also incorporates some very mainframe-like features - for example, you don't need to number the models rows in the correct logical sequence as it can sort the rows itself as it calculates.

It comes with the best manual on the market and it's suitable for most micros with CP/M operating systems, at least 64K of memory and a minimum width screen of 80 characters and 2 floppy disc drives. (It'l) even run on the new IBM personal computer |

But if PlannerCalc is thus good, how can we afford to sell it at such a low price?

Simple

Because we know just how good it is.

And because we know it's going to sell in thousands. (In the U.S.A. we sold 5000 copies in the first month alone.) more powerful packages like MasterPlanner, the next step up in the Comshare range

Which is good news for both of us.

Because when you do make that move you won't have to reprogram

Masterplanner is totally integrated with Planner Calc and you simply carry on where you left off

But first you'll need to get hold of PlannerCalc

To order, clip the coupon and enclose your cheque to credit details (but, please, no small change) or ring Teledal on 01-200 0200 and we'll send you PlannerCalc, the manual and list of Comshare's other business software

Making the computer make sense

*CP-M is the registered trade mark of Digital Research list.

mashare Ltd. 32/34 Great Peter Street, London 5 to 17 27 to 17 77
London SW1P JDB Please send mecopies of PlannerCalc at £46.05 mc VAT and p.&p per copy, I enclose a cheque/postal order for £ made payable to Comshare Lamited
Please debit my Access Card No:for £
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Please allow 28 days for delivery VAT No. 2384 19649 Registered No. 980406

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... the quality of the colour display is excellent". Popular Computing Workly "The graphics facilities are great fun". Personal Computer World "...the Spectrum is way ahead of its competitors". Your Computer

"The world's best personal computer for under £500."

Sinclair ZX Spectrum 16K RAM £125, 48K RAM £175.

This is the astonishing new ZX Spectrum The ZX Printer - available now a powerful professional's computer in everything but price

There are two versions + 16K or a really powerful 48K. Both have a ful-8 colours, sound generation, a full-size. moving-key keyboard and high-resolution graphics. Plus established Sinclair. features such as 'one touch keyword entry syntax check and report codes!

Key features of the Sinclair ZX Spectrum

data

nual

Full colour - B colours plus flashing and brightness-intensity control

Sound BEEP command with variable pitch and duration

Massive RAM - 16K or 48K

Full size moving key keyboard - all keys at norma, typewriter pitch, with repeat facility on each key

High resolution - 256 dots honzontally x 192 vertically each individually. addressable for true high-resolution graphics

ASCII character set - with upper- and lower-case characters

High speed LOAD & SAVE - 16K in 100 seconds via cassette with VER FY and MERGE for programs and separate data files:

The printer offers ZX Spectrum owners the full ASCII character set ~ including lower-case characters and high-resolution graphics

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch

ZX Microdrive – coming soon

Each Microdrive will hold up to 100K bytes on a single interchangeable. microfloppy with a transfer rate of 16K bytes per second. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum - they re available How to order your ZX Spectrum

BY PHONE - Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal aftention 24 hours a day

BY FREEPOST - use the coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard

EITHER WAY - please allow up to 28 days for delivery. And there s a 14-day. money-back option, of course. We want you to be satisfied beyond doubt - and we have no doubt that you will be

sinclair **ZX Spectrum**

Sinclair Research Ltd. Stanhope Road, Camber ey, Surrey

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Curse of the personalised mailshot

'Dear Mr Allason I am writing to you personally

Oh yeah? Sifting the genuinely personal letter from the personalised mass mailshot is becoming more difficult all the time.

A year or so back mass mail shots were detectable by the sheer awfulness of the type quality either smudgy laser printing as favoured by Render's Digest, or the dot matrix printing employed by less well heeled outfits

Since daisywheel prices crashed from around £2,500 to the current £500 mark, detection has become much more difficult. Microhacks who receive more of these letters than most, have learned to look for that evenness of typing and the limited character font that typify the daisywhee.

Now even these limitations are being swept aside in the drive to achieve authentically manuaic bad typing

Zygal Dynamics (tel: 08692 3361) are about to push out a Diablo daisywheel printer that can run a wheel containing 192 complete characters and part characters, which can construct over 400 different symbols. That compares with the 88 or 96 character wheels in correct use

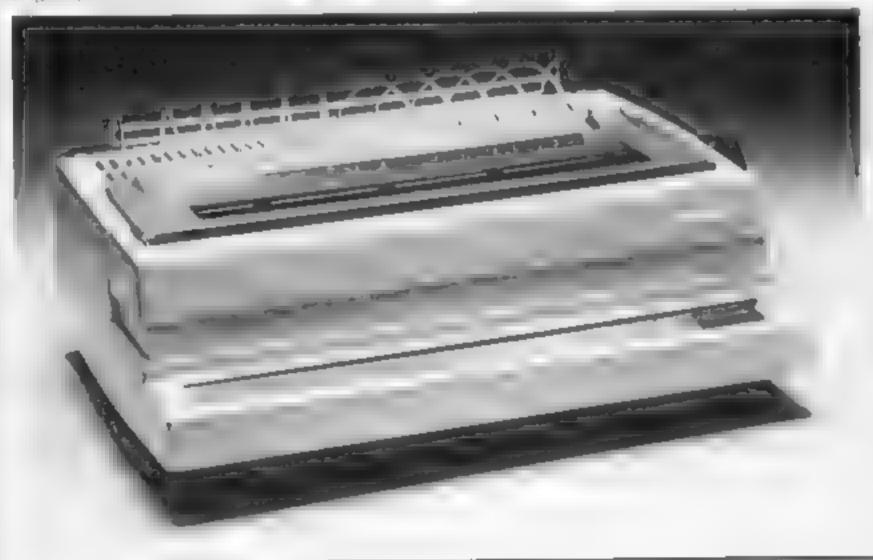
This new model design ited the 630 ECS will be able to prior standard and strike that itets without changing daisywheels. It should be well received in technical and mathematical circles where daisywheel printers have long been cursed for their lack of special characters. The mass in alers will probably buy it in droves.

One of the new wheels will produce the complete copy of Teletext screens. The ability to reproduce Teletext graphics may well also put further damper on dot matrix sales. Teletext graphics may not he quite up to hi-res reproduction of your lady wife but the character set is adequate for most types of business graphics, and even low resolution plotting

If you are considering electronic or all this could be the printer for you since the Teletext character set is the most likely standard to be adopted

Mind you, even electronic post offers you no escape from junk mail. More than a third of the messages handled by one such Stateside utility, called the Source turned out to fall into this category. And guess who owns it?

Readers Digest!



Micro disk madness

You want the good news or the bad news?

Right The good news is that four top floppy disk drive manufacturers – Dysan, Shugart Tabor and Verbatim have got around a table, and ves, they have agreed a standard. For the new micro diskettes

These are the tiny three to I har inch media that will provide the storage on the forthcoming generation of portable and pocket microcomputers

Standards ves. I know this column is obsessed with them covering 14" hard disks, 8 floppies, and, most familiar of all 51/4" minifloppies – have existed for some while now, and are almost universally accepted

Now comes the bad news Standardisation of sizes never extended to read/write disk formats. In other words, a disk made on an Apple will read back garbage if you try it in a SuperBrain. And that goes for many supposedly compatible CP'M diskettes too.

I can't think of a single good reason why the same chaos won t ensue with micro diskettes. Can you?

P S To further depress you here's news of a jumbo deal that Hewlett-Packard have just signed to use Sony's new 3½" disk

And guess what?

It is not compatible with the new 'standard'

S-100 standard not a standard – official

Never make a defence or apology before you be accused advised King Charles I before setting out for lunch with his bank manager

Sound enough advice, unless you happen to write about computers or the stock market for a living

So ir indepation of the accusation that this column ignores S-100 bus computers, I present the case for the defence

First a bit of background m'Lod

harly microcomputers were configured around a group of 101 ines, or has, designated S-100. The theory was that additional printed circuit boards – interfaces graphics cards and the like – could be plagged into any computer a thering to the S-100 bus standard, and work.

That at least was the theory Such is the way of the world that different manufacturers soon discovered different ways of improving the S-100 standard. In no time there were almost as many S-100 standards as manufacturers. It certainly made plugging in an S-100 standard peripheral exciting

Some of the hest
microcomputers you can buy
Comart Communicator
Cromemoo and North Star
Horizon for example – use the 5
100 bus 'standard'. And their
marketing people are much given
to talking about the advantages of
standardisation.

Their marketing people are talking codswallop

Who says so? Not me (the Latter not to mention our liber insurers, wouldn't allow me to)

The microprocessor standards committee of the Institute of Feetingshard Electronic Engineers does albeit maintime to neabout way.

In fact they have just refused to classify S-150 as a standard, on the grounds that it suffers from a prouteration of options or "levels of compliance" as they call it

So although we will continue to report the wonderous advances made by Messrs Cromemco and company, you won't be reading much about the benefits of standardisation

Case rests in Lud

Sirius soft interface

Interfaces, ugh! Don'tcha hate em? I mean they look ugly, and rarely seem to do quite what you want them to.

Take IFEE-488 for example It s the standard means of connecting scientific instruments to computers, and the very name conjures up visions of unwashed boffins with beards

IEEE-488 was also one of the main reasons the early PETs established a foothold in the scientific market. Until that is the bearded ones discovered that Commodore's idea of an IFFE-488 interface wasn't quite the same as the IFEE's (Institute of Electrical and Electronic Engineers)

Flavour of the month amongst the boffins just now is the ACT Sinus 1 - they like its all soft design. But the Strius lacks IF E E 488

The penny dropped on the Hagley Road early this year when ACT salesmen started reporting

cases of Strius-phobia amongst the men in white coats - due to tack of instrument interface

At this juncture the Brummies did something rather clever, they pointed Harry Broomhall at a Sirius

Now Harold Algernon Edwin Broomhall FRAS may not be a name that is instantly familiar. But amongst the Interface Crowd he's a star, if not the star A boffin's boffin, in short

Harry sat down and wrote a software puckage that reconfigures the Sirius I's parallel port to the JEE-488 standard

This software consists of a set of high level routines written in ssembler (Harry thinks in issembler), which can be called from a high fevel language such is BASIC Lotal hardware requirement one conversion cab.g.

The Strius is configured as a controller and can command other



devices on the bus to talk or fisten

[Hey, if you don't understand this, don't warry you'd in they di-

What will be of interest however, is that it allows PLT files to be lifted directly onto the

Whether or not Commodore are overwheamed by this news well, would you want your customers apprading to a competitive system? I think we should raise a gliss to Harry

After all he has just invented the invisible interface

In the best possible taste

Do you belch after meals? Make offensive remarks when ladies enter the room? Wear wellies in your lounge?

Ha! We thought as much

With yobs like you around, it's no wonder the huntin', show to tax avoidin' set will have nothing to do with micros

Well it has got to stop. And if you will kindly remove your finger from your nostril for one moment, I will tell you how you too can become a tasteful micro person

It will set you back about £900, mind, but bearing in mind the possible social spinoffs ("No. after you, Ma'am"), it's a snip at the

It is our pleasure then to present Lancashire Furniture's new Technology with Taste' regency-style antique-look desk.

For those whose lack of refinement approaches the terminal, Lancashire Furniture also offer a special free Tasteful Design Service Have your butler call them on 0254-676011 today



Electronic non-message

Draft It's 6/20: I've missed the post. And this vital communication mast reach my bookmaker by 9-30 tem in which by monthing. (they don't accept begging telephone calls)

What to do?

Clearly this is a heaven sent opportunity to try out British Telecoms' new fangled Felemessage: 50 words plus address cabled to your addressee's nearest sorting office and delivered with the next morning s post

Sorry, Sir, the Telemessage service closes at 6 p.m. " said a sepulchral voice at the other end of the phone. It didn't sound

But I thought the Telemessage was supposed to replace the te ceram? [ventured

It is, Sir" said the voice Would you like to send a telegram

I sent a telegrism and my carefully worked out fifty words plus address cost a shattering £10 50. No wonder the service pretends it sidead

The solution to this nonsense must be electronic mail. And if you lived in America you could have your microcomputer route a the ssage to any one of the half million or so subscribers to the Source or CompuServe microaetwerks

There is an option for us Limevs It is called Prestel, and I think it works something like this Subscriber A (that's you) dials up Prestel, climbing your way down a seemingly endiess 'tree' of 'memis until you are through to the message box service. Assuming you know Subscriber B's box number you can leave a message in her box

Most messages are apparently Please telephone me

I am not surprised

Note Perhaps readers can tell us more about Fleetronic Mail, as the Prestel Press Office doesn t answer letters and hasn't got. mailbox. I wonder why?

Irresponsible corner

You think 'Bomb Buenos Aires was in had faste?

Just wait til you see Choplifter! from Broderbund Software

The scenario has the player piloting a helicopter based for some reason, at an American Post Office. He is tasked to rescue 64 kidnapped UN delegates who are being graphically zapped in a number of imag native ways

The joy of this game comes in the amusing graphics and sound" say the distributors

Apple owners with £21 95 burning a hole in their pockets can appal and disgust right-thinking relations by contacting Pete & Pam Computers on 0706-227011

Genie out of a bottle

What an odd lot Genie users are, and to judge by some of the red hot missives that seared their way into my in-tray this month, not inexpert with a sizzling simile either

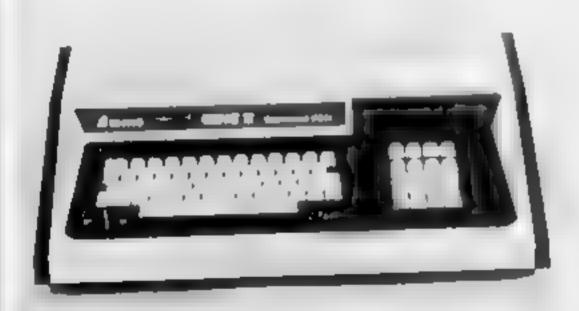
There was in fact an entirely valid reason why the Genie was omitted from last month's league table of topselling micros. It is this.

Some 11 000 odd Genie Is and IIs have indeed been sold here, according to our friends at Lowe Electronics. However, current sales are not what they were.

system always knows the time and date 640 x 288 pixel high resolution graphics will be available as an option. Ditto user definable characters

That's our scoopetie. And you won't have read about the forthcoming Colour Genie anywhere else either.

Like the VIC-20 it will allow up to 16 colours on screen at one time, it also offers 128 programmable graphic characters in addition to 128 that are preset 3 sound channels, full size typewriter keys and an internal



There is a good reason for this too. In fact, two good reasons

The first is the Genre III, whose appearance is imminent and whose resemblance to a certain Tandy Model III is entirely coincidental. Well, almost

You get 64K of RAM, 730K dual floppy disk drives and a 12 screen all built into a single unit It is Z80A hased, of course, and CP/M and Level II BASIC is thrown in

There are several nice touches, including a CMOS real time clock with battery back up, so the

power supply. The normal screen format is 40 characters by 24 lines with 160 x 96 pixel resolution in graphics mode.

At £199 and VAT the Colour Genie could give the VIC-20 and Atam 400 a run for their money, et alone the more expensive Tandy Colour system

None of this was supposed to be announced for a week or two yel but you know how it is with news - once it gets out of the bottle, you can't put it back.

Just like a Genic

Machine Code for VIC

Nicely on top of BASIC are we? What about dipping a toe into assembly language then?

Hey, come back! It's not that difficult Especially if you have a well written assembler package at your disposal

VIC users have, thanks to those awfully nice Supersoft people MikroAssembler is described reasonably enough in our view – as an "advanced yet easy-to-use package which enables even novices to produce compact machine code programs." We'll perhaps not complete novices

Anyway it is a cartridge which includes a Machine Code Monstor (the equivalent of the PETTIM) which facilitates the display of blocks of machine code for modification or storage on tape of disk. As you would expect there is also an Assembler and facilities to preset the contents of the processor registers, insert and delete capabilities and a SAVE and VERIFY routine.

Another nice touch is a high resolution plotting facility based on a 176 x 160 matrix, that lets you draw lines, plot points and even specify colour

£49 50 to Audiogenic at P O Box 88, Reading secures your entrance to the world of VIC assembly language

In touch with Aliens

Ahens have just invaded New York's West 23rd Street. They are small, dark and speak with sinister Dalek style voices.

They are not green. The Aliens are also flogging Voice Boxes for the Atam 400 and 800 computers at \$169 (about £100). Plugged into the senal port, the synthesiser routes speech through the TV loudspeaker.

You will need at least 16K of RAM to lead the software, which is available on disk or closette. The system includes a dich mary which translates typed text into Voice Boxes' phonetic language. The dictionary can be expanded to include up to 5000 words of your own vocabulary – which may or may not be a Good Thing.

The speech routines can also be called from other programs, so in no time your space invaders can be hissing on ster threats. I distinctly heard one of them mutter 'We will bury you', a threat I had previously associated only with Mr Kruschey.

The Alien Group, who as previously advised, reside at 27 West 23rd Street, New York 10010 also accept Access or Barclaycard orders on 0101-212 924-5546

Heart transplant horror

Small boy to Emperor If the 68000 is the best 16-bit CPU, why are so many people buying HORR based computers?

Emperor: We shall require notice

Emperor We shall require notice of that question

While the Imperial Presence consults its Civil Service, let us consider the alternatives

I mean, supposing you already own an Apple, PET or other 8-bit machine, you might not want to dispose of it and start again from scratch. Especially if you had had a look at second hand prices lately.

Happily, there is an alternative in the shape of Digital Acoustics 68000 hoard. Fit the board inside Apples and PF I's and prestol You have a brand new 16-bit computer with 92K of RAM and no loss of ability to run all your old programs as before

Digital Acoustics are an American company residing at 1415 E. McFadden, Suite F, Santa Ana, California 92705 UK distribution arrangements have still to be fixed up, in the meantime they will supply direct.

Like the Emperor's clothes, you won't be able to see much, but by heavens, your old machine will surely run like the devil

How to choose a computer

What is it exactly that leads people to choose one particular micro computer from the two hundred or so models currently available?

It is no idle question, particularly
if you suspect, as I do, that in
most cases, chance has a lot to do
with it

An instant and entirely unscientific straw poll of the first half dozen micro owners I spoke to this week revealed a wealth of equally unscientific teasoning

"I liked the name" (Apple II

Plus)

A friend had one and I thought we might swap software" (PET 4016)

"It was cheap" (ZX81)

"I had read a lot about it (ACT Sinus I)

"I wanted to follow the TV programme" (BBC Model A)

"We already had one in our other office" (North Star Horizon)

What these responses have in common is that none of them are valid reasons for choosing a particular micro; at least not in the sense a computer consultant would understand

I then put the question to our own tame consultant David Eldridge How should you set about choosing a computer?

According to David, the key is software. 'Ask around, see who has the right software for your application. Then when you have a shortlist, try the packages out, talk to real users. It's the only way

To that entirely sound advice I would add one caveat when considering hardware, always overspecify to take account of future expansion. It is clear from your letters that many systems that seemed ideal a year ago have since run out of steam, as file sizes have increased, and more sophisticated software has been added. Especially don't be mean with memory, disk or RAM variety.

Through the looking glass

The time has come the Walrus said. To talk of many things

Last month the trade press was full of talk of the imminent topping of Sinclair from his throne

Of Ships and Shoes, and Sealing Wax of Cabbages and Kings

The cabbage, so to speak, who is to toppie King Chye from his throne is one Gura Lalvani

Mr I alvane's firm. Benatone are to make a wonderfur new compater with colour graphics sound. I6K bytes of RAM and a typewriter keyboard. All for under £50. Furthermore, it's purchasers will be blessed with the ability to run Tandy Software. It would they said, smash Sinelair.

Could we see it we asked. Binatone

No. They hadn't actually seen it themselves

Could they tell us more about 1 then?

No. Mr Lalvam was the only person in the company who knew anything about it

Court we speak to Mr Lalvani '

And why the sea is boiling hot \text{And whether pigs have wings}

Unipart printer

Of an evening the wizehed survivors – Tommy is one of the early days of computing like to put their feet up in front of the fire Tapping out their pipes on the hearthside they tell tales of those far off days when you could plug a printer into a computer and it worked

Them days be gone says one The others nod sagely and drink deeply from their tankards

And alas the old boys are right As printers have got eleverer, the software needed to drive them has necessarily become more complex Compare say a Quine Sprint 5 Diablo 1640, Philips P2000 and one of C Itoh's TFC models and you would find they needed completely different word processing commands

The appropriately named Appropriate Technology Company of 2.4 Carfield Place London N.W. 6 (tel. 01.625.5575) have thought long and hard about the problem. The fruit of their cogitation is the RP1600 Flowriter an extremely robust, very fast (60 cps) daisywheel printer that's just that much research rotelligent.

The Appropriate idea is that you just plug it into any system and go, which is a lot eleverer than it woulds



By offering the extra intelligence it has its own Intel 8085 microprocessor and 8.5K bytes of RAM memory on board – the Flowriter takes the burden off your computer, the result is much faster throughput

On top of that you have got an embryonic intelligent typewriter Drowers r

This approach extends to interfaces too. Just tell them whether you want R\$2320 ITEE 488 or Paradel Centronics and that's what you will get

I suppose you could call it the Unipart approach to computing

Cybernetic cuddle

Here s proof, or as the Legless One would say, pruf that robots are getting so realistic that they can ... well, in the interests of decorum I teave it to your imagination exactly what they can do

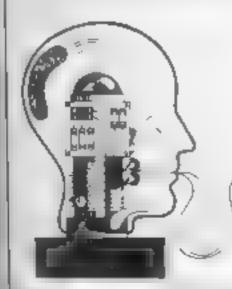
The Robot pictured here being kissed by lovely Vivien Carev rejoices in the name of Laid-Back Larry. He doesn't look as if he is enjoying it, does he? Perhaps—but surely not. Perish the thought!

Laid-Back Larry is the property of Oxford Systems, the PETSPEED people. For the uninitiated PETSPEED is the BASIC compiler that speeds up PFT programs.

Oxford Systems have a secret new project. Perhaps it can put the twinkle back in Laid-Back Larry's eve



Comshare slashes Calc cost



Comshare, long big bananas in the world of time sharing could be expected to know quite a lot about financial modelling

So their new PLANNE RCALC program for CP/M machines should be interesting. The price

certainly is. £39 + VAT

Like VisiCalc and the rest at is an electronic spreadsheet with a window that can be sero led in abdirections. The rules are entered in English rather than mathematical notation It is said to run on just about every micro with an 80 column screen, 64K of RAM disks and the ability to support CP/M

The horrible object below is Comshare's logo, believe it or not

HOTLINE

Hole in One

No This man is not Honest Joe Wozmak, Bookmaker to the Stars

He is in fact top amateur golfer, Keith Roberts, whose company FRA Consultants of Stockport, have developed a system based on the Osborne 1 portable computer, that automatically calculates individual handicaps, produces printed competition score sheets instantly, and handles golf club administration. All for £2,500 including the computer

I shouldn't be surprised if it does the washing-up as well



Gentle reader

As you may have noticed, we keep growing larger

No not me, you oal the magazine

And unlike some of the competition, more pages means more editorial

Managing the sort of growth we have experienced over the past two years has been exciting, and on occasion, a little wearing. One of the (few) drawbacks has been the growing amount of time I have had to devote to administration not my strong point — when I would much rather have been out there exploring this bizarre micro business on your behalf

The Editor's demands for a faster secretary and a younger Porsche did it (On second thoughts that should read a faster Porsche and a younger secretary)

We need the resources of a big publisher behind us," I decided Choosing the right partner was the hard part

Frankly I wasn't overlespressed with most of the publishers who approached us until, that is, we were contacted by Benn Brothers a public company with equal amounts of enthusiasm, expertise and er, cash. The dirty deal was

done and as of this sauc MicroComputer Printout is published by Benn Brothers p 1.c

The bad news is that you lot are still stuck with our lot. That is to say men the Editor, plus faster scaretary. Tommy, Inside Trader, 'Chris Preston, Terry Hope, and all the other hooligans. Fortunately for us we are still stuck with Pam and Wendy to keep the whole thing from coming totally unglised.

As for the mag, well, it can only get better can't it?

There's gold in them that disks

Lunch Last week City of London Fat cats Cash to invest Software promising Point us in right direction Cut you in Suce of action All get rich End of story

That telegraphic tale is fruc The lunch took place last week. It lasted four hours. And me on a diet. Ah well

What it proved to me is that if you have a good idea the investment is there for the asking If you have a bad idea, and it relates to software, you will probably get the money. Take a look at some of the ventures surfacing in the Stock Exchange & Unlisted Securities Market (Motto Caveat Emptor).

Still the odd thing is that hard y anyone manages to consistently make money out of micro software in this country. Real money, I

Part of the reason is that the software publishers seem to share the traditional distate of hardback publishers for anything that smacks of marketing. Check out the ads, often little better than a list of titles, with at best a few tines of impenetrable jargon.

All this could change, what with Microsoft opening an office here under David Exocet' Low and three of personal computing a most creative thinkers are quite independently planning major software ventures. They are Michael Healy (M.D. of Osborne Computers), Roger Foster (M.D. of A.C.T.), and Peter Laurie (ex. Editor of engineering rag. Practical Computing.)

But while the great cogitate a small Portsmouth based outfit called Telesoft is out there running Fast

Telesoft's speciality is the import of high quality American programs, for Atari - "at reasonable prices, not the obscene levels that have been the previous going rate."

I will drank to that

Canon's DIY Database cum Calc

A new microcomputer needs to be pretty special to command media attention these days, at least in the reputable journals, although there are one or two that merrily trade editorial mentions for advertising

Canon's CX-1 microcomputer isn't that innovative, which accounts for the relative paucity of press mentions. What is special about Canon is that they, almost alone of the Japanese manufacturers, seem to have recognised the importance of software (What about Sharp? - Ed). (Alright, include Sharp, but you're spoiling my argument - JA).

Canon have commissioned a program called CXCAT, short presumably for CX 1 CATEGORIZER It is a programless software package that adapts to a variety of applications anything from stock control to statistics, in fact

Although it is based on a simple idea. Do-it-Yourself minidatabase cum Calc – it is potentially quite powerful. The essence of it is that you design

your files to match your specific data requirements. So if it is a personnel system you need, you define the file as an employee record, specifying record length column width and titles, and the type of data to be entered in each column.

CXCAT guides you through the next stage, that of data entry, with a series of conversational step-by

step instructions, allowing you to enter the data, row by row column by column, or at random

Thereafter CXCAT organises and processes the information according to your instructions. And just as in any Cake program there is a calculation function that lets you enter a pattern of instructions, e.g. SALES (FIXED COSTS + VARIABLE COSTS) = NLT PROFFI

Nothing revolutionary, perhaps but a potentially useful system that should garner extra sales for Canon



"Every PET owner should read it"

Chuck Peddle, Inventor of the PET

"The PET Companion" is a fascinating collection of essential PET information from the pages of Microcomputer Printout It contains all of the editorial from the 1979 & 1980 issues, including 105 PET programming hints and tips, 116 news reports, reviews of 54 peripherals ranging from light pens to printers and 27 major articles on PET programming. All of it written in straightforward English



PROGRAMMING THE PET HARDWARE REPORTS

The New Holly on the service of the service

Towns where yeary in my new morning by reading PET

SPECIAL OFFICIAL



THE PET COMPANION

The PFT COMP * ** at the property of the PFT Company of the property of the pr

MicroComputer Printout, PET COMPANION OFFER, P.O BOX 2, GORING, READING RGB 9LN

PET COMPANION OFFER

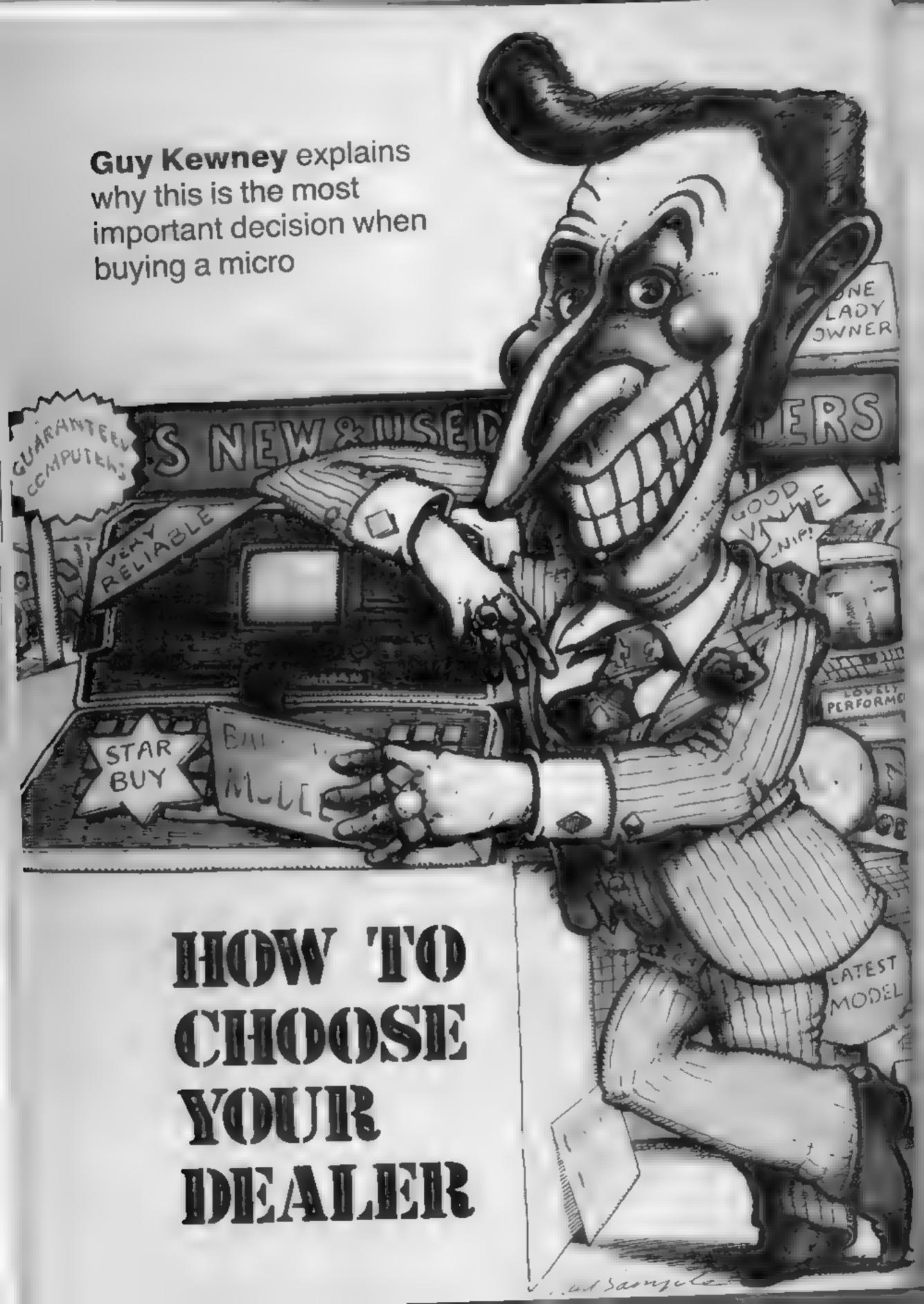
U.K. and EIRE ONLY

Such has been the demand created by our special offer for The PET Companion that we have decided to extend the expiry date to 31st August. Not only have we extended the expiry date, but we have also reduced the price. Now a copy can be yours for just £5.95 inclusive of post and packing. Don't delay — send for your copy today, and why not buy one for a friend for Christmas too?

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It is more important that you choose the right computer dealer, than that you choose the right computer

With a good computer and nobody to help you make it go, you are entirely on your own, and will waste time, money and sweat getting to the point where a good dealer can get you with an hour's training – at a feel of course. And a really good dealer may even be able to claim that he stocks only good computers.

The question is what is a good dealer?

In the good old days, a micro dealer was somebody who wanted a PET but couldn't afford it. In order to afford it, the plan went, you should buy five at dealer discount rates, selfour at retail prices, and keep the fifth (free).

To get the five at dealer rates, you got in touch with Commodore (or whoever you thought made the best micro) and announced that you were selling up a dealer-ship.

That was 1

If you were a customer, you were a freak – In those days, there were no customers. The other four machines, quite often, went to four other equally enterprising enthusiasts, who conspired with the first to get their machines at a discount.

The trouble is that today if you are a customer, you can still feel as if you were a freak. All you have to do is pick the wrong dealer.

You can end up with an over-priced piece of outdated junk, capable of running only a few over-priced programs, which don't work until you have spent six months practising. Even then, they take twice as long to do any job as it would take you to explain it to an intelligent school leaver, because they aren't very useful.

And if you comptain that the equipment doesn't suit you the dealer will look at you with honest bewilderment. "We've never had any trouble of that sort with it," he says, in Ingued by your ability to fail where so many had succeeded. He has had enthus astic informed, even expert customers, most of whom know more about the bus ness and the machinery than he does. All he is there for is to collect cash for the distributors. What else?

Sheer determination

Dealers in this country, like those in America succeed mainly because of the sheer determination of their customers to buy equipment. And the question I most dread (after "which computer do you think I should buy?") is "Who do you think is a good person to buy a computer from?"

The answer to both questions is very simple "If you can't tell yourself you aren't ready to buy"

Giving that answer however, takes some nerve it usually chicken out with some vague recommendation to go on an evening course in computing preferably with a polytechnic where there is also a thriving computer club or Computertown UK branch

Perhaps a more honest answer would be 'There are machines which go wrong and there are dealers who can't find out what it is

and they are in the majority of both dealers and of machines "But I can't bring myself to say that in public, because I am an enthusiast myself, and have a deplorable instinct for "spreading the Gospel" of micros

So finally, pinned down hard, I have to admit that there is a simple checklish and that it may help in selecting a dealer

First and most important, the dealer must be nearby. The squeaking wheel, says the old proverb, gets the oil, and the nearer you live to the dealer, the more often you can squeak.

This is important. A truly fantastic dealer who is more than fifty miles away will turn the awesome power of his servicing on those customers who live near him and complain in person every day, and bring faulty items back immediately. You, being out of sight will be out of mind.

Think of it from the dealer's point of view He sells (it is Tuesday) two dozen new modern cables, to connect various computers to the phone system. Two of the cables are faulty. One goes to the man working on the next floor of his office block, and one goes to you, in the next city.

Both of you take your cables, and return to your offices

Within ten minutes, the local man is silting at his computer pressing buttons, and cursing Within another ten, he siback downstairs, facing the dealer. "This modern cable" if doesn't work."

"It does, I've sold two dozen of the damn things. You haven't plugged it in upside down, have you?"

Abashed, he goes back upstairs, and find that you can't plug it in upside down. Back down he is facing the dealer again, this time with his temper in rags. "What kind of twit do you take me for? You can't plug this cable in upside down. You get upstairs right now, and get it working, or you can forget that order for a daisywheel printer."

Fast one

An order for a daisywheel printer is an order for well over £1,000, sometimes well over £2,000 if you can pull one fast enough

Ten minutes later, the dealer is showing his customer a loose wire inside the cable. He thinks of making some comment about people who don't treat precious cables properly, but his customer's face is still a bit red. He saves if

Later that afternoon, you get to your computer. It fails to function, so you phone the store.

"Sorry, my boss is busy with a customer, but if it's important, I'm sure he'll ring you back."

By the time you eventually get in touch with the man, two days have passed "Modern cable?" he asks, puzzied. "We don't have any in stock, I'm afraid "It can take a lot of expensive phone call time to get things straight, and he will end up suggesting that you bring the thing back, and he'll have a look at it

By the time you eventually get back to his town, modern cable in hand, he has completely forgotten the entire saga, hasn't a clue, and starts from square one "Are you sure you weren't plugging it in upside down?" You have to admit that it's four days and a weekend since you tried, and you ready can't be sure. Feeling an absolute fool, you drive back home.

Yes, one day you will get the thing to him and he will find out what s wrong – by then the cable will be a month old, and when he finds the broken lead, his immediate assumption will be that you've been using it for a skipping rope.

That's just with something nice and simple like a cable

Oh, come on, let's be honest leven a cable isn't simple. You try connecting a computer to a printer yourself, and see how long it takes to get right.

Now that the importance of engineering support has started to penetrate, it is time for the second important point about your dealer. That is, he must not, on any account, be able to supply adequate engineering support.

Let me quote Colin Stanley, director of HB Computers, and now chairman of the Computer Retailer's Association, for an explanation of that apparently daft notion

"Take a small High Street computer shop." Stanley suggests. "It is making money by selling hardware and software, and with any tuck it is turning over £30,000 per month, and making a 35% margin. Work that out yourself—but it means that the guy who started the shop probably banks £100,000 in a year and probably puts half of that into his pocket. A nice wage for anyone."

So it is The other half goes on costs – electricity delivery, phones, and so on and on. After the first year however these costs start to get a bit bigger

Installed base

"The installed base starts out at nothing, giving no problems. As if gets bigger, a proportion of all the users start needing help, needing repairs, needing advice, needing fraining Our hero finds, two years after he started,
that he is so busy supporting all these people
that he has no time to sell machines — so he
does the obvious thing. He hires a qualified
engineer, and he hires a training expert."

He can't afford to be without a training person. He can't afford it because you can't afford it, when you call in with a need for training in "How to Use Supercald" you don't want to find him booked up for the next two weeks.

The trouble is, thinks Stanley that he fails to see that while he can't do without training and engineering staff, he can't afford to hire them, either. That £50,000 was a very nice wage but it's not much cop shared between three and there is still only one guy selling. He can't suddenly double the turnover.

Stanley reckons the answer is to set up branches, and then have a central engineering and training department. Actually, he only wants the training department until he is very big, because local engineering support still and possible.

If you don't believe me, watch a TV repair man at work

He comes in response to a centrally organised service call. He takes one look at the set, and says something like (he may say this to himself): "Oh look, the old mode: RT#456 without sound dewobulator. But the grungecase is filtracicating again."

He's had twelve of these already this week. He knows that there aren't any spare grunge-case sproatbaxels, so he can't replace the faulty part. But he also knows that if he wires the flat truchorankin backwards, it will work for a month of so – by which time parts may be available, and another engineer will be able to repair it. He's done five like this in the course of the week, and none have called him back yet. Murphy alone knows why it works, but the engineering people in head office said to try it, and so far nobody's been killed.

He rewires it backwards, and is gone ten >

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* * NEW COMMANDS NOW AVAILABLE

BORDER	100	Draws a border around the edge of the screen
CLOCK	250	Continually displays the time at a given screen position
GRAPH	20	Gives access to the box-drawing characters on an 8032
ON	50	Branches to program line corresponding to key pressed
PROTECT		A lows regain of control after system crash
STATS	120	Outputs the number of statements in the current program

* * NEW FUNCTIONS which may be used in any expression

AVG	140	Calculates the average of the elements in a numeric array
BLANK	40	Tests a string returns true if the string is blank
DEC	80	Gives the decimal equivalent of a hexaded mal number
FACT	60	Provides the factorial function.
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The Operating System is a part of the computer you see very little of, yet advertisements for the new generation of computers suggests it could be the most important. So what exactly does an operating system do, and of what importance is it to the user? Chris Preston explains.

A question which is often asked by microcomputer users is "What exactly is an operating system and what does it do." One reason for this tack of understanding is that on a typical small home computer, there is only one language available and there is no real distinction between the operating system and the language, and both tend to get lumped together as "The ROM"

However, the new generation of microcomputers will support several languages so that the presence and quality of the operating system is going to matter very much in the future which brings us back to the question, "What is an operating system?"

An operating system is really only a program, or usually a suite of programs, designed basically to take a lot of the donkey work out of writing a program for the computer it runs on. If every time you wanted to write a program you had to write your own cassette file handler, you would soon appreciate the need for an operating system?

One of the most important functions of an operating system is to present a common interface to all the individual language systems which run on the computer. Each of the anguage systems may well have been written by different

companies, or at least by different teams in the same company. Human nature being what it is each development team is going to be convinced that their way of doing things is better than their colleagues' down the corridor, and each language system is going to end up with different file structures, command syntax etc. As far as the computer user is concerned, he might as well have three different machines as far as compatibility is concerned.

File Structure

With the benefit of an operating system all the different programs share the same file structure and command syntax, regardless of what language they use. This makes ife much more civilised for the user, who can buy a package written in, say PASCAL or PL/1, and then add on programs in BASIC to do some special processing he needs. We will come to more advantages, ater on in the article when we discuss the separate modules which comprise the operating system.

Having sold you all on the importance of an operating system, what goes into it? Well, that really does depend upon how powerful the operating system and computer are and also targely on the design. If the computer can have several people on separate terminals each running their own programs, or maybe all running the same program if they are all keying in data to the company sales ledger, then the operating system needs to have modules to do a lot of work not needed in a single-user system. More of this later but we will start with a simple microcomputer system consisting of a screen/keyboard, disk drive and printer. We can draw a simple block diagram showing the various modules which go to make up the system.

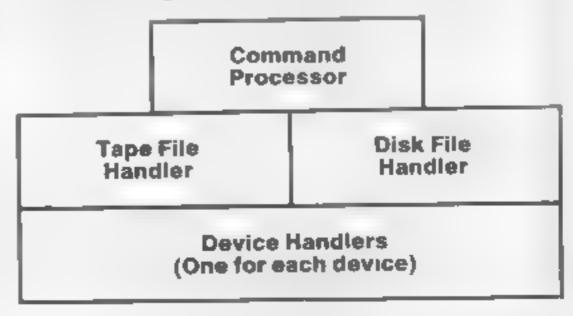


Figure 1

At the lowest level, the operating system must have a device driver for each peripheral on the system, such as the disk and printer. The device driver is the program module which actually talks to the device. In the case of a printer, its job is quite simple. The device driver will receive its data in a buffer from a higher level module in the operating system and have to send this character by character, to the printer After it has sent each character if will have to wait until the printer signals that it is ready to accept another character. The other device drivers will have similar functions to perform, a though the disk driver for example will be more complex than the keyboard driver.

Having a single driver for a device regardless which anguage is in use shows another advantage of a good operating system. If each device driver communicates with higher level modules by means of buffer, then a program running at the highest level need not know whether it is printing" to a printer, or to, say, a disk file. All the devices on the computer will behave in the same way. This facility is present to some extent on CP/M, where it is possible for example to tell the operating system to direct all screen output to the printer.

A so a device may be changed perhaps a printer upgraded to a faster modle or a floppy disk changed to a hard disk. In our operating system only the device driver has to be changed, all the other software running on the system can remain unaltered.

The next level module in the operating system is the file handler. Again there may only be one file handler, but this is not always possible, as the file structure on a tape for example, which is a sequent at device and cannot easily perform random access, will be different to that on a disk unit

Device driver

The file hand er converts the data from the format required by the user program into a form usable by the device driver For example, a floppy disk unit reads and writes data in blocks of 256 characters, called sectors. A program running in BASIC will be writing in blocks of data meaningful to the programmer, called records, which can be any length. The file hand er has to "block" and "unblock" the data on its way to and from the disk unit.



Figure 2

Requests from the user program will be in the form "Read record number 258" or "Delete such-and-such a file". These have to be converted into the form "Read track 15 sector 21" for the device handler. A real operating system should also be able to locate a record on the basis of an alphanumeric key such as "DTV143" instead of miting programmers to numeric keys (record numbers). This facility is woefully lacking on most so-called business microcomputers, which means that each programmer has to write his own system, with varying degrees of success.

Notice that the command processor does not necessarily have to go through a file handler. Some devices such as keyboards, screen and backup disks may not be file structured, so the C.P. communicates directly with the device handler.

More powerful operating systems running on the larger microcomputers of the future will also support more complicated file structures than we have at present. If we have a file of customer information for example, certain file structures make it easier to ask the operating system, "Give

me all the custoamer who are more than two months late paying."

Included in the disk fee handler is a module which maintains the disk directory. The information in the directory has to tell the operating system which sectors on the disk are free, and also where all the sectors assigned to a particular file are to be found. In addition the directory may hold information on each file such as the creation date, date of last update,, whether it can be written to or not, and so on.

Above the file handler, and at the top level of our simple operating system is the command processor. This is the equivalent of the BASIC direct mode on many micros, in that it accepts commands relating to loading and running programs, dispraying disk directors and copying files, for instance. This is the "user interface" and it controls the image that the user things of a "the machine". This image can bear little resemblance to the actual computer, and is often called a "psuedo-machine". The job of the operating system is to make this as simple and convenient as possible, and it is a tribute to a good operating system that the user does not real se that what he sees is not the real machine.

There is another major aspect of the operating system on large computers which with the introduction of 16-bit micros is now beginning to affect micro users. This is the



sharing of the resources of the computer between several programs or users "Resources" in this context can be peripheral, such as disk drives, or memory and processing time.

For example, if three users are sending data to a printer at the same time, what appeared on the paper would be a few lines of output from one program, then a few from another and so on. Our poor users would need a pair of scissors and a pot of glue to make sense of their printout linstead the operating system diverts the data from the user programs to a disk file, called a spool file. When the printer is free, one of the spool files can be sent lunder the control of the operating system, to the printer, all in one go

Obviously, not all these "advanced" features of operating systems will appear on microcomputers in the next year or so, but they have already begun to appear, and will continue to do so as the power of the micro increases first on business computers, but moving down to the home computer as time goes on. Eventually (no doubt from Clive Sinclair, costing peanuts and using half a dozen of his new tlat TV screens!) we will have a home computer which Junior can use to play Space Invaders on, Sister can talk to her new boyfriend and Mum to her half rdresser over the telephone, while Father tries desperately to be ance the family budget, all at the same time

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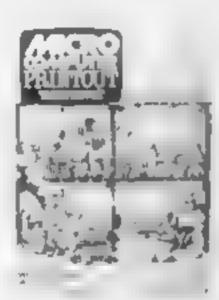
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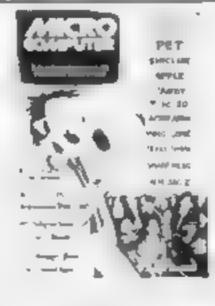
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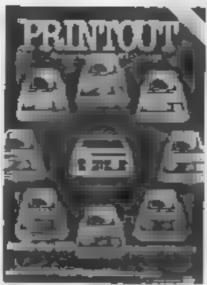
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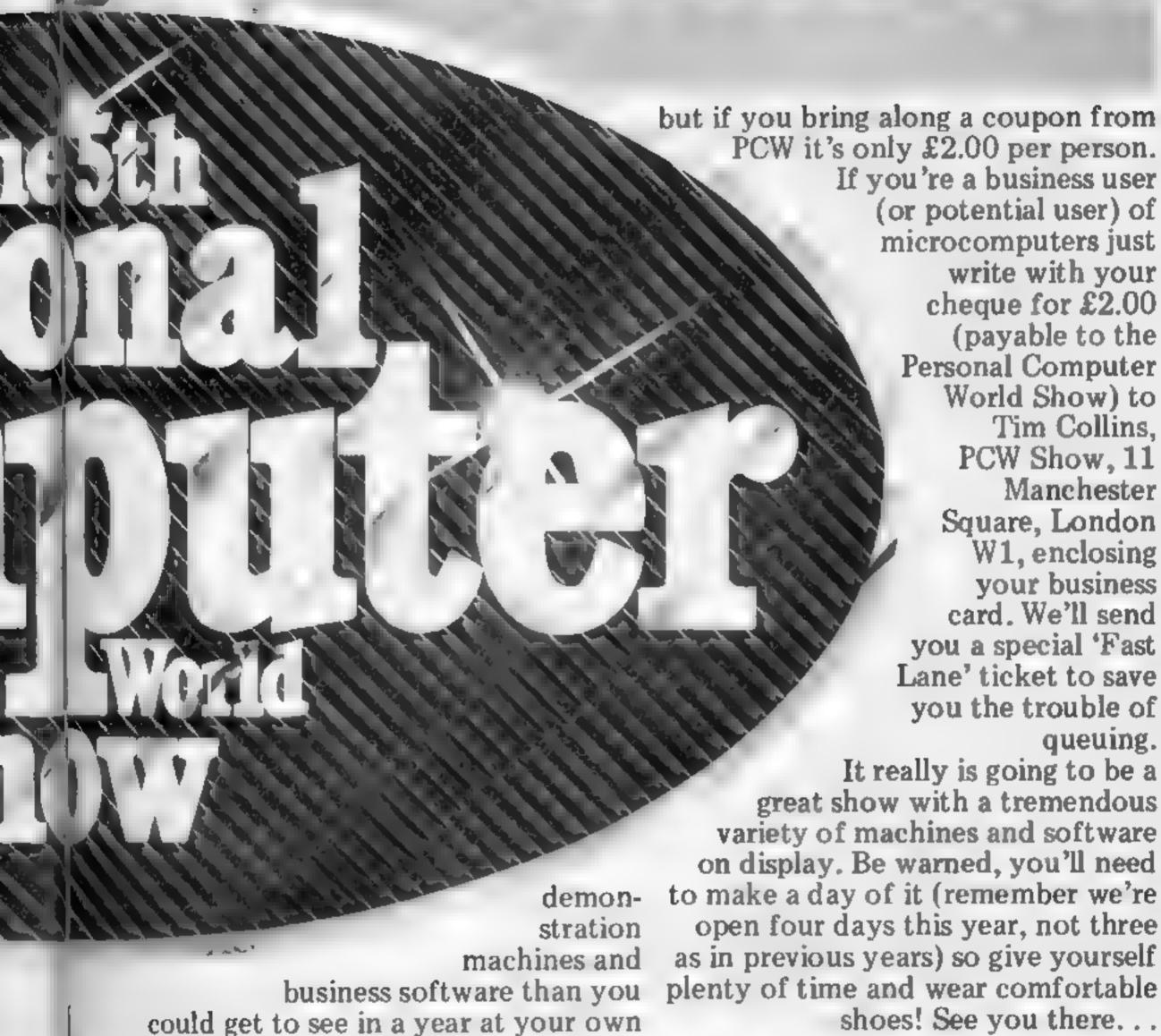


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Paul Gladwell, winner of the competition, gets to grips with the Osborne 1

We present the winning entries of our 'Win an Osborne' competition, and explain how it was judged.

When we conceived the idea of our 'Win an Osborne competition in the July issue, we had no contion of the kind of response it would generate. For those whold do tisee the onginal entry form, we asked readers to submit a short essay describing an original application for an Osborne of the low-cost portable micro invented by Adam Osborne. The winner would be presented with the computer, kindly donaled to *MicroComputer Printout* by Osborne UK.

The weeks that followed saw a burgeoning postbag containing an incredible variety of applications. While a tow were predictable and distinctly unoriginal, the majority ranged from the creative to the outlandish. One farmer envisioned the Osborne 1 driving his tractor automatically via an ingenious network of servomechanisms and radar beacons at each corner of the field.

A serving officer from the Falkland Islands Task Force explained how the Osborne could have he ped in the log stics and supply/support problems. By far the most common ideas were in the medical records and secondary education fields, with salesmen using Osbornes to prepare on site quotations, and journalists requiring portable word processing following closely.

First pass

When the Editor's In tray finally buckled under the sheer weight of entries and the sun went down on the closing date, the judges (Richard Pawson, and Mike Healy - MiD of Osborne UK) were faced with the awsome task of selecting a winner. First pass resulted in a hundred or so candidates who all deserved to win, but were eventually

whitted down to thirty, then ten and finally to three. By this I in the judges had capiturated into awarding runner-up es for the second and thirdip aces. Before disclosing the winning entries however, just how was the competition judged?

Well first of all we looked for *originality*. What we wanted was a specific application – not a general list of the many ways in which an Osborne could assist a sma business for example *Simplicity* helped too, since the best notease in productivity comes from doing one task well rather than several badty. Indeed, the degree to which the computer would aid *productivity* was a major factor.

We were very careful however, to avoid applications which had obviously been contrived to win. Though we considered it essential that the winning entries would to unite an Osborne 1 as distinct from just any micro at prications which made use of every conceivable feature of that machine just didn't ring true. *Practicality* was the key and full marks to those who had done their homework.

Limitations

You see though the portability of Osborne had been expected in most ideas, many did not consider its imitations. We certainly liked the idea of a water flow engineer who wanted the Osborne in a rubber dingy – but regrettably the machine is not waterproof. Some went for the Anian cial diffrans Sahara expedition entries. And though many had read of the shortly to be released battery pack – few who made use of it had considered the 2-hour mitation and need to get to the mains on a requiar basis.

Clarity of writing became important as the passes through several hundred entries were on into the small hours. We would hasten to add that we weren tout to judge the quality of English prose (as witnessed by the fact that none of the winners were journalists). More the judges were



MINIEL

tooking for a clear explanation of what the computer was doing

Finally we would like to make clear that we deliberately gnored the deserving nature of any entrant. That is to say we could not unduly favour the many excellent suggestions coming from charitable bodies or those working with the disabled not disfavour companies who could well afford a dozen Osbornes, or indeed those working in the microindustry.

Congratulations & commiserations

So there it is Obviously many of the unsuccessful entries were stronger in one particular area – and judging by the covering letters received at least half our contestants seemed utterly convinced that they were on to the winner. So in addition to our congraturations to the three winners the judges would like to add sincere thanks and commiserations to the many entrants who thoroughly deserved to win an Osbornel Better luck next time.

Mike Healy, Richard Pawson

The winning entry

And now the moment you've all been waiting for! The winning entry was from Mr. J.P. Gladwell, of 1 Leigh Way Weaverham. Northwich. Cheshire, and his essay on using the Osborne for, and-surveying is reproduced below with the judges' comments. Mr. Gladwell is pictured receiving his computer at the offices of Osborne UK and being heart y congratulated by the two judges.

Modern land surveying usually consists of setting up a traverse of theodolite stations, and then taking field readings of varying, distance and height differences to specific points. Each point may be a feature (e.g. fence line house corner, etc.), or a spot level

The field readings are converted into x-y co-ordinates and plotted on to paper. The surveyor then sketches in the detail, and the final plan is produced by the drawing office.

The task of computing co-ordinates and plotting the points is one that can readily be undertaken by a microcomputer. The writer has produced a set of programs called "PointPlot", which run on a 64K micro, and interface with a precision drum or flat-bed plotter.

If often happens that a surveying job takes several days (or even weeks) of field work away from base in the meantime the office computer and plotter may be standing relatively idle. At the end of the week, there may be thousands of points to enter. Equally there are times when the surveyor could be entering data into a computer, e.g. when "rained off", or in the hotel in the evenings.

Now with the Osborne 1, each surveyor can have a computer in the boot of his car. The additional cost is not significant. his E.D.M. (electronic distance measuring) gear has probably cost £10 000 or more. Each evening, the surveyor can enter a days work into the Osborne, and file the results on floppy disk, which is then posted back to the office. (Ultimately, data can be transmitted back over the telephone lines, using the Osborne's modern facility.)

Back at base, a steady stream of diskettes arrive by

post and are read into the office machine and plotted out. The plotter (an expensive precision machine) is kept busy and data entry is kept down to manageable proportions.

Hardware requirements are 64K of RAM twin disk drives, and numeric keypad for data entry. The office machine needs an R\$232 port to drive the plotter, and an extra port for a printer. Software is available, but needs revising into CP'M.

Judges comments

"We were particularly impressed by the practicality of this application and its obvious bearing on product vity. Mr Gladwell has carefully not suggested that the machine be lugged around all day with the other equipment, but rather that it is used in the hotel room each evening and when weather prevents normal work. This is dearly a very real problem for surveyors.

Special st software needs to be written, but the idea has a ready been proven

Mr Gladwell has indicated scope for future expansion with the transmission of data via modern. Clearly, however this set up is not essential at the start.

Finally, the application is sufficiently general to be of use to a large number of people.

The second place goes to Mrs L. A. Woolfson of the Roya National College for the Blind. Hereford, for her project with blind students. Mrs. Woolfson has been sent a £100 Harrods/House of Fraser token in addition to the complimentary one year *MicroComputer Printout* subscription and silver Space Invader Badge awarded to all three. The latter, for the benefit of newcomers to this mag is a solid silver laper badge, designed and commissioned by us to be worn exclusively by winners of our competitions. The reason they are so highly coveled is that only 30 were ever made. Mrs. Woolfson's entry appears below.

Visually handicapped and blind children can be successfully integrated into the ordinary school system only if there is adequate provision of classroom material in Braille. Because of the small number of children involved resource centres are being set up to serve children in several schools in the area. Both peripatetic and other teachers involved with the blind need to prepare Braille material at a number of locations, home schools and at resource centres.

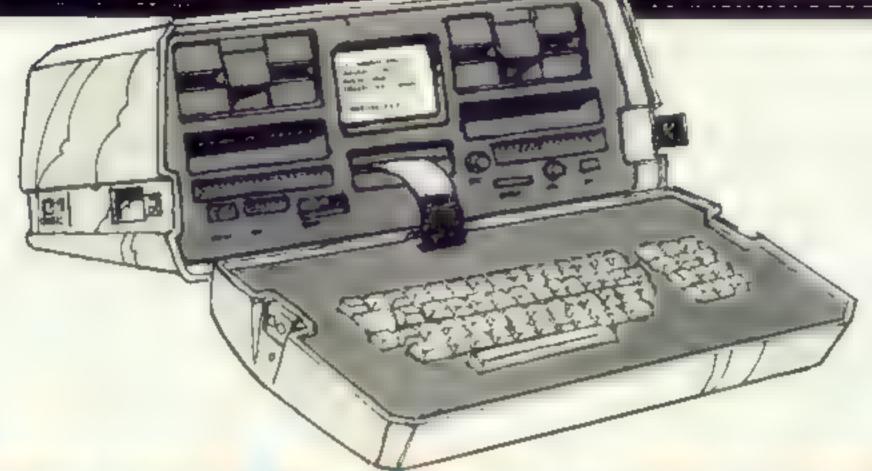
The resource centres will have Braille embossers, but two other elements are still needed. These are a suitable portable and inexpensive method for the preparation and storage of class handouts and a computer program that will convert English into contracted Grade 2 Braille.

The Osborne 1 meets the first objective and the Braille translation program in its final stages of development here at the Royal National College for the Blind meets the second requirement

The Osborne 1 is inexpensive. Its operating system is CP/M for which our Braille translation program has been written. Wordstar, which comes free with it, will enable teachers easily to prepare and modify text, and the floppy.

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disks will store this information. The R N C B Braille translation program will also reside on disk and when executed, will generate a further file in Grade 2 Braille. The Osborne 1 can then, because of its portability, be transported to the resource centre where, with its RS232 serial interface which comes at no extra cost, it can be connected to a Braille embosser which also has this standard interface.

Braille material can then be run off, with as many inexpensive copies as required, on paper instead of the expensive plastic material normally used.

Further, the original version of the text can be printed on any printer, thus meeting the needs of both sighted and blind children simultaneously

Judges comments

"Many entries concerning the disabled were received but this one deserved the most merit on the grounds of simplicity. It is not a complex one-off research project, but a practical deathat could benefit many blind young people and makes good use of the Osborne's features.

Though additional (existing) hardware would be required (an example of computer-generated Braille was enclosed) the software was simple, and made use of the word processing package

in third place the judges chose Mr. Roger Valentine of V & H. computer Services, 182c Kingston Road, Staines, Middx who has in mind a portable accountancy bureau.

The unique feature of the Osborne 1 which is exploited in my 'new' application is its PORTABILITY

Actually this is not a new application at all, but a variation on a very old one, what I have in mind is a totally MOBILE accountancy bureau

With the prospect of personal computers for all possibly the concept of a computerised BUREAU may seem like a superfluous anachronism, but I believe that this opinion stems from an outmoded view of the ROLE of the bureau

In olden days, accountancy bureaux were operated by anyone with access to a maintrame, knowledge of accountancy was NOT a pre-requisite, and the bureau merely PROCESSED data, which was then INTERPRETED by the accounts department of the client. The advent of the micro has meant that many smaller bureaux have arisen along similar lines, which has brought them within the range of much smaller businesses. Unfortunately, smaller businesses do NOT, on the whole, tend to have 'accounts

departments'; either the prophetors handle their accounts themselves, or they delegate responsibility to a book-keeper. In these cases, the accountancy bureaux certainly save TIME, but with a personal computer bureau. OR manual system, it is still down to the book keeper and accountant to do with 'real interpretive work.

There are, however, a small number of SKILLED accountant/book keepers working on a free-lance basis for small businesses. They are VERY expensive, and they can only handle at most five clients at one time (one day per week each). Given a micro, they could increase their productivity about 4-fold (2 hours per day per client), and reduce their fees accordingly, thereby becoming accessible to the smallest of businesses.

Impractical? No. This is precisely what we have been doing for the past three years. The only problem, we are doing the whole thing on a highly NON-portable PET. Consequently we spend most of the day driving between clients, picking up boxes of paperwork, working on them at home, and answering queries by telephone. The advantage of the Osborne is obvious. We could work at clients' premises, travelling time would be halved and problems could be discussed on the spot.

Software requirements nothing new – most of the commercial packages are unnecessarily large for the size of clients concerned, but we have written easily adaptable PET programs

Hardware requirements again nothing really although it would be nice to see an Osborne portable printer one day!



Cause for celebration! Shown here: Paul Gladwell (left, our own Editor (centre) Mike Healey (right), Martin 'Legless' Banks (under the table)

Judges comments

"Accounting on a micro is hardly the most original application, but here is an idea that will genuinely save time and costs for a lot of people interestingly. Mr. Valentine is proposing a solution for the many small businessmen who can't afford their own micro. This is personal computing as it was intended – a productivity aid to the professional not a vast information processor."



TOMBYSTIRS

First of a I I must offer my apologies to all my faithfull readers and friends at the Commodore Show who (I hear) crammed the bars looking for me. Unfortunately, the proverbial "circumstances beyond my control" meant that I did not make it as far as London. You can ignore any rumours that my absence was due to an excess of the Editor's hospitality on the previous night though.

I did make it to the Apple Show which (coincidentally?) was being held at almost exactly the same time, not more than a in le from the HQ of Commodore UK! My first thought was that I had gone back in time two or three years. I am afraid that the show (organised by Windfall magazine noidentally not Apple UK) made several mistakes which I remember well from the early micro shows three or four years ago. At the stands were crammed together with very narrow corridors so that if you were looking at a particular product, you were continually being jostled by passers-by And the heat!! Not as bad as the Cafe Royal but still extremely uncomfortable. Another important requirement is fairly open areas with tables and chairs for the wheeling and dealing which is so much a part of a successful show.

Moving on to the actual products on show, I was looking out for two part cular ranges of products commercial programs and industrial hardware. The commercial software was very depressing indeed, being again three years behind what is now available on other micros. Basically, it could be summed up as badly thought-out poorly integrated and very badly presented. Several stands seemed to have only just got hold of the software themselves, not to have much idea how their products worked, and not to really care too much. Of course I was neggnite.

On the industrial side things were a lot better, at least the vendors knew their stuff, but a lot of the products seemed over-priced to me. One interesting feature of the show was the number of "Apple lookalike" computers consisting of an Apple board with a few of the standard add-ons, 80-column cards, serial or parallel interfaces and so on thrown in. These ranged from very good value to absolute rip-off, so be careful!

SYS and USR

Dear Tommy

I have several questions relating to the SYS and USR functions

- 1 What is the difference between the two functions?2 Where is the numeric value of the USR function passed
- to?
 3. The Price Device (Uncle Costan's Letters No.5) raised many questions in my mind (Dear Uncle is very interesting but bloody obscure!)
- 3.1 The device was primed by a SYS 826,A\$.B\$ command. This seems to be an example of parameters being used with a SYS command. Where are these parameters being passed to? Please explain the method used to extract the parameters (reference 150/151, \$CF7B)
- 3 2 Where is the exit of the "Check for string" routine \$CCA9 when the argument is not a string?
- 3.3 What mods are required to this routine for new ROMs?
- 4 Is a list available of addresses to interprete routines which can be used by SYS/USR commands?

 J. Morton

Phew what a lot of questions! Well, a deep breath and here we go

The SYS command, e.g. SYS 57234 just causes control to be transferred from BASIC to machine code at the address given, 57234 in this case. No parameters are passed to the assembler routine. The USR function has a single numeric argument which is evaluated by BASIC, and the result left in the floating point accumulator, 94-99/\$5E-\$63. This is an area of memory used by the interpreter's floating point arithmetic routines, such as ADD. DIV DE, SIN etc. Of course, for this to be any use, you need to know where these are and how to drive them. The best publication is probably "The Hitch-hiker's Guide to the PET" sold by ACT, closely followed by "The PET Revealed", available from many outlets. I hope that one of these books will also help Mr. J. Denton-Smith who also would like to know more about the operating software.

The parameters are passed to the interpreter's parsing routines which are called by the Device. When the SYS callis executed by the interpreter, the test pointer used by BASIC is left pointing to the comma just after the 826. The "Check for Comma" routine checks that you have in fact put a comma in and not a question mark or something. The next routine parses the variable you have specified and returns to pointer to the BASIC variable. The "Check for String" routine makes sure that you had given a string variable. If you had put in a numeric variable by mistake, you would get the standard BASIC "TYPE MISMATCH ERROR". So after parsing all the arguments, you are left with two pointers, one to A\$ and one to B\$.

So what comes next? This is the format BASIC uses to store the details of a string in the variable table (the data itself is held in the top of memory), and is called a dope vector.

Length Address (low byte) Address (high byte)

To swap the strings, all we need to do is swap over these two vectors. BASIC has to do a lot more work, which involves actually moving the data itself around, because PET BASIC, unlike some other languages, lacks a SWAP instruction.

Here is a short conversion table for the "Price Device

	Old ROM	New RON	BASIC4
Check for comma	\$CE11	\$CDF8	\$BEF5
Parse Variable	\$CF7B	\$CF6D	\$C128
Check for string	\$CCA9	\$CC90	\$BD89
First pointer	150/\$96	68/\$44	68/\$44
Second pointer	176/\$B0	94/\$5E	94/\$5E

I hope that this has sorted out all your problems. Although it is not really practical for us to publish pages and pages of ROM disassembly, if neither of the two references above can help, why not drop me a line?

The dastardly DS

Dear Tommy

I have access to 3008 and 4008 PETs. I have written a program which runs perfectly on the 3008 but continues to crash on the 4008 at line 190 which reads.

190 SD=DS+A DS=0

The only conclusion I can arrive at is that either SD or DS must be a reserved word in BASIC 4 but not in BASIC 2 Is this correct? If so, what is its function and are there any similar reserved words used by BASIC 4 and not BASIC 2 which I should look for?

B Pierce

You've got it! DS is indeed a reserved word in BASIC 4
Together with DS\$ it is used to interrogate the disk status
Under BASIC 2 to find out if a disk error has occurred, you
had to do an INPUT #15 A\$ B\$,C\$,D\$ which read the error
number name, track and sector into the four variables. With
BASIC 4 things are a little easier. DS\$ reads all the status
information into one string, DS gives just the error code, so
you can test for a disk error quite simple.

100 IF DS > 0 THEN PRINT "DISK ERROR", END

DS and DS\$ are the only new 'variables' which are reserved under BASIC 4

Point of no return

Dear Tommy

On my PET 4032 I have developed several programs which wait for an answer to a Y/N prompt controlled by the GET statement e g

10 GET A\$ IF A\$ <> "Y" AND A\$ <> "N" THEN 10

If I follow this with an INPUT statement, how can I prevent the program terminating by a mistaken pressing of the RETURN key after the Y or N?

A.J. Harrison

There are many ways of avoiding this, here are just three to be going on with. The first two work by throwing away any characters which the operator has keyed in, and can be sluck in before the iNPUT statements.

100 GOSJB 1000 INPUT "ENTER YOUR NAME", A\$

Firstly we have

1000 GET A\$ IF A\$ < > THEN 1000 1010 RETURN

This is a straightforward routine which just reads every character out of the keyboard queue so that you start the INPUT statement with a clean state.

A little more subtle is this

1000 POKE 158 0 RETURN

This has the disadvantage that it may not work on a future release of BAS. C or on a different machine

The third method is to stop the INPUT statement aborting the program when nothing is entered. The simplest way to do this is by giving the INPUT statement a special prompt, instead of saying.

NPUT "ENTER YOUR NAME", A\$

you we have to PRINT the prompt. For the INPUT statement prompt, you must enter 3 shifted SPACE characters and 3 cursor-left characters. Now the INPUT statement will not stop the program if you just press RETURN, and you can test for this by saying.

100 IF A\$ = CHR\$(160) THEN

Once again there is a sneaky way of doing this, which was pointed out to me by Paul Hooper of Liverpool. The INPUT routine in the interpreter is also used by the INPUT# statement, which in effect just changes the input device from the keyboard to, say, the cassette unit, then calls the

INPUT routine. The INPUT routine uses a zero page location to test if the input is from the keyboard or another device, and in fact this is one of the few zero page locations which is different between BASIC 2 and BASIC 4.

100 POKE 16.1 REM, POKE 14,1 FOR BASIC 2 110 INPUT "ENTER YOUR NAME?", A\$ 120 (F.A\$ = "" THEN 110 130 POKE P.0

There are two things to watch out for Firstly, the INPUT routine will not now print the question mark after the prompt string, so if you want one you will have to include it in the prompt string as above. Secondly, the INPUT routine will not print a carriage return after the INPUT statement, so you may have to put in some extra PRINT statements to keep your screen layouts OK.

Colourful language!

Dear Tommy

Being the owner of a 40-col. PET who would like colour output on the screen, but not wanting to purchase a VIC and rewrite my software, I wonder if you could help with the following questions.

1 Will any of the chips from the VIC (e.g. the character generator) work in the PET? (Assuming a colour screen has been used to replace the present one)

2 If not, will those in the VIC 40 (which is apparently more compatible with the PET than the VIC 20) be useable? I am not interested in the graphics at the moment, just normal text output

3 As I already use the user port, is there any way to use the VIC's lightpen, paddle and joystick on my PET?

R C Pickup

I am surprised that nobody has written before about this Unfortunately, there is not much joy for you. The VIC video system is built around the Video interface Chip which gave it its name. The only way to use any of the VIC circuitry in a PET is to go the whole hog, rip out all the PET video o rouitry and replace it with the VIC system, rewrite the ROMs accordingly, and rewrite all your programs to use your new 22 column screen! In short, as I said—no hope

Similarly, the VIC lightpen and padd as use the VIC chip, and cannot be used on the PET. The only chance you may have is with some joysticks, which use four digital switches instead of having two analogue potentiometers mounted at right angles. These could be connected to the user port and tested for by a PEEK statement.

On the other hand, were you to purchase the VIC – or the new Commodore 64 – I think you would find it surprisingly easy to rewrite and run at your PET programs

Stacks of memory

Dear Tommy

My CBM 8032 is giving me an "OUT OF MEMORY" message after a dozen or so passes through a record keeping program, with files on disk, that I have written myself

My Toolkit shows me that the error is occurring in a FOR NEXT loop and the manual tells me that since FRE(0) shows plenty of memory available, this is probably because the stack is full

I have little or no understanding of the stack, so what can I do about it please?

P Blake

HOMNISHIRS

The stack is the area of memory BASIC uses, amongst other things, to store FOR-loop and GOSUB information. It is only 256 bytes long, so it is not too difficult to fill it up if you are not careful. The usual problem, however, is a bug in the program rather than a program being too big or complicated. The most likely cause is a GOSUB without a RETURN, which means that each time you call the subroutine, you use up extra stack space which is never freed by a corresponding RETURN. Check all your subrout nes to make sure that there are no possible exits by a GOTO rather than a RETURN; especially error and except on handling exits. It is good practice only to have one RETURN at the end of the subroutine, and if you want to eave the subroutine halfway down so to speak, GOTO the one and only RETURN. The other possibility is that you have simply got too many active FOR-loops. Are you ever just jumping out of a FOR-loop without finishing it off? This is the on y safe way to leave a FOR loop

100 FOR I=1 TO 100 110 IF A(I) < 0 THEN I=100 · REM SEARCH FOR NEGATIVE ELEMENT 120 NEXT

Finding these bugs can be a great problem once a program is written, it is far better to get into good habits from the start.

Long playing record

Dear Tommy

Some time ago I got hold of a secondhand Apple II with various extras, and set to to teach myself how to use it. I

recently got as far as using random disk files, and I must admit I got into a pretty mess at first. I think I have got the mechanics sorted out but I cannot understand how the data is actually held on the disk, and what happens if the string written to the disk is not the correct length? Why do you have to specify the record length in the OPEN command? Cannot the DOS get it from the string you write to the disk? Also, what is the use of the B parameter when selecting a record number?

W.P. Johnstone

It will help if you think of the file, not as it is recorded on the disk, but as a straight line

START BOX BANK

BYTE

Figure 1

I	RECORD #1	RECORD # 2	RECORD # 3	RECORD # 4	
ľ	1	21	41	61	B1

Record length = 20 bytes

DOS calculates that the record starts at byte 201(n-1) +1

If you now tell the DOS to write to record number 3, it has to find out where the record is, and it can only do this if I knows the record length. Some operating systems hold the record length in the disk directory, but with the Apple system you have to give the length each time you open the file. Having found the record position (and the byte will in

▶ 83

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Technical Specification

Hardware

Processor Memory

280A running at 3.25 MHz 8K bytes ROM 3K bytes RAM

Inpu

40 moving-key keyboard with auto-repeat on every key

Output

Memory-mapped 32 x 24
character display with high
resolution user graphics. Output
10 drive normal UHF TV set on
channel 36.

Sound

Provided by internal loudspeaker

Cassette

Load Save & Verify at 1500 baud, separate data storage

Software, FORTH Data Structures

ofe fer. Floating point and \$1 ingidate may be held as constants, variables or arrays with multiple dimensions and mixed data types.

Control Stuctures

F THEN ELSE DO LOOP
BEGIN-WHILE-REPEAT, BEGINUNTIL, all may be mixed and
nested to any depth

Operators

Mathematical +, -, X, +
Log cal AND OR NOT
XOR
Comparison < > =

Program Editing

FORTH words may be a sted. edited and redefined. Comments are preserved when words are compiled.

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Under growing pressure from unions, computer manufacturers are now placing as much emphasis on the exterior design as the workings. James Woudhuysen, former editor of DESIGN magazine, explains what 'ergonomics' is all about, and how to spot a well designed micro.

One of the very few growth sectors of the international publishing industry these past few years has been that which covers the ergonomics of computer terminals. Even back in 1980. Colin Mackay, senior psychologist at the Employment Medical Advisory Service of the Government's Health and Safety Executive, could write a 12 page booklet entitled "Human factors aspects of visual display unit operation" (HMSO, £1 50) and include no less than 57 different references on the subject. Parallel with the rise of scientific interest in computer ergonomics has come the rise of commercial attention to the issue. More and more computer manufacturers have stressed the 'user friendliness of their machines

Things have got so sophisticated in the mainframe sector that manufacturers such as Olivetti, Philips, Nixdorf, DataSaab and Siemens now put out special ergonomics manuals with their machines. But what about the ergonomics of microcomputers?

Of course, the question every mic recomputer user would like answered is simply, 'what constitutes good ergonomic design on a micro?' But if you ever get a snap reply to this you can be sure you re talking to a marketing man, not an ergonomist. An ergonomist will tell you that the question is a very complex one, that it all depends, and so on. And, trustratingly enough, he it be right

Good ergonomics on any computer is first of all about what you want to do with it something that varies a lot from user to user True, there are some ground rules on keyboard and VDU design, and there are also some suppliers who can be considered as ergonomic leaders, not only in mainframes, but in micros too

But before going into these aspects of the problem a quick look at what ergonomics is and how computer ergonomics first grabbed the limelight

Ergonomics means a lot Roughly translated from the ancient Greek ergonomics means 'legislation for work'. As a discipline, it was born in the Second World War when new weapons technology, the need to use (and train quickly) conscripts long hours of anxiety and boredom and short bursts of intense concentration, ar conspired to make research into occupational stress' essential. Britain has always been good at it (the National Coal Board's ergonomics department is one of the targest in the world), the Soviet Union taxes it very seriously (Soviet tank interiors are reputed to be ergonomic masterpieces.

and the number two in Soviet design is an ergonomist of international standing), and America has a flourishing academic and corporate culture in what it calls human

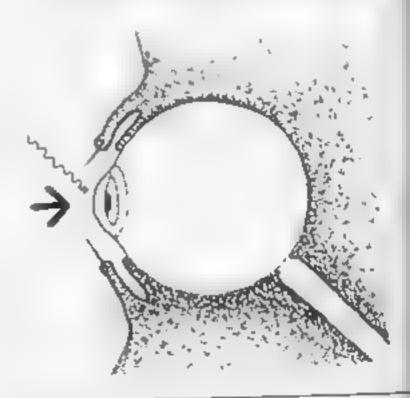
'actors Which brings us to an important point According to Dr. Ivan Brown, of the Medical Research Council's Applied Psychology Unit, Cambridge, ergonomics (the British term) used to be more about anatomy and anthropometry, while human factors (the American term) used mostly to be about applied psychology. Now, however, the two terms are roughly synonymous both ergonomists and human factors experts acknowledge that, as far as human behaviour is concerned, mental and physical processes are indivisible, if only because modern technology has become so taxing to work with

n this article we shall, purely for reasons of space, deal with broadly physical problems - we il leave the more cerebral ones to another issue. But the 'broad y in the past sentence is there for a purpose Keyboard layout, layout on screen, colours on screen, etc. are all matters which directly over-ap both hardware and software domains. The designers of Xerox's 8010. Star Information System office personal computer for example, have gone on record as saying that they had to do 30 man-years of research into 'where the user's head was at before beginning hardware development. So don't imagine that programming methodology doesn't have anything to do with musclepower, because

The unions started it

it does

Where however, do a, today's obsessions



DESIGN at Ergonomics on micros

With computer ergonomics spring from?
Well from the reactions of users – unionised users

Back in the mid-seventies. Scandinavian and West German trade unions became the first to wring concessions out of the employers on computer installations, and loday Denmark Sweden Norway and West Germany are the countries in which leg station on terminal design is most advanced (it is a statutory requirement in West Germany for instance, that keyboards be equipped with pads for operators to rest heir hands on). The reasons for this state of affairs are simple enough, the four countries were amongst the first to invest in computerised offices, and they were and remain countries in which union participation in the planning of new investment is particularly well-established - in contrast to France or the USA, where looser industrial relations environments obtain. However, the nons the unions made a fuss about ergonomics were far from simple.

In Denmark and Sweden stokes took piace over the ability of soph sticated. rerminals to monitor worker performance counting the number of keystrokes made an hour was one of the favour te techniques. for doing this). That was enough to warn managers of all nations off crude, 'if you don't like it, ump it approaches to the introduction of new technology, so other issues lended to become more prominent instead. These were roughly in order of discovery radiation hazards, visua, fat que epilepsy and overall workplace design in other words, good ergonomics' tended to become a more and more subtle business. as the unions became more and more experienced in dealing with the gadgets.

their members were being asked to work

Ergonomics is not therefore a wholly technical, 'objective thing - it's social too. and because society changes, it changes Today VDUs have been given a clean bill of health as far as X-ray, radio frequency microwave and Litraviolet emissions are concerned but unions are still agitating. about them. While union membership in the white collar sector has expanded the rise in monetarist attitudes among management has meant that a big gap has opened up between white collar union size and white collar union influence. In 1982, white collar unions see in computer ergonomics a relatively 'soft' means of getting consulted and thus recognised by management

The International Federation of Commercial Cierica and Technica Employees (FIET) published Ergonomic problems with visual display units in the banking and insurance industries in 1976. Within three years, chapters on computer ergonomics appeared in APEX's Office technology, the trade union response the NoJ's Journalists and the new technology NALGO Action Group's New technology and the Social st Workers Party's is a machine after your job? The interesting thing about these pamphtets was that whether moderate or militant in tone, they

* said roughly the same thing about computer ergonomics, mainly because they used the same 'establishment sources on the subject

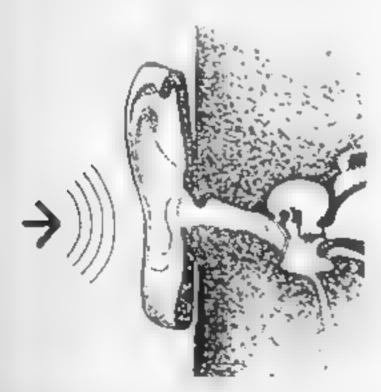
* overestimated the extent to which computers would be introduced into British offices, given widespread financial stringency.

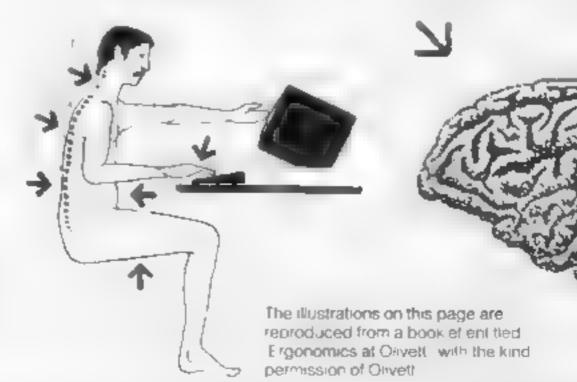
* conversely, underest mated the extent

to which those few companies which could afford to introduce computers in a big way would be prepared to spend money on ones guaranteed to go down well with staff.

"underestimated the speed with which computer-makers would adjust to the market requirement for good ergonomics

in fact what has happened is that as a consequence of union pressure, the eighties have seen most of the major. (physical) ergonomics problems directly associated with maintrame terminals solved Today, computer ergonomists are more interested in the interacation of terminals. with their surroundings than with keyboard or VDU construction. George Sowden. British-born senior office products designer at Orvetti, Milan, sums up. 'Just as the first. motor cars looked like horseless carriages. so terminals started off looking like typewriters-and-screens. But once the technology had matured a bit and people had realised that because no one operator. position is best flexibility is all - then brains keyboard and screen went their separate ways. After that, brack net filters came in as a way of minimising extraneous reflection. ("glare") on screen, and manufacturers started to crank refresh rates up to fifty hertz. or more to avoid bringing on epileptic fits There are still "intrinsic" problems with terminals very black, glareproof screens tend to make characters look, ke forches in the night and new high definition technology. sionly just coming on stream. But most major manufacturers have got it right. Olivetti recently supplied Abbey National with computers to the tune of tweive to lifteen million pounds, and it obviously had







f you're a teacher buying micros for your (ites the three separate units (computer keyboard and VDJ) that some micros come as could mean three times as many accidents or npoffs at school. You'll need to ensure that the manual that goes with your micro is big enough not to get lost easily, and that it will withstand rough treatment irruggedness is vital on an school equipment.

be used by secretaries or journal stathey may find its differences irritating in comparison with the boards they relacustomed to if on the other hand you're going to spend most of your time playing games or jugging numbers on your micro the precise alphanumeric layout on it isn't going to bother you too much if you're billingual and into words, you might want to

to be able to promise the creat that its machine wouldn't prompt union resistance. The real ergonomics from the these days is the environment.

Fine The snag is, though that while unions may have lorded mainframe terminal manufacturers to sharpen up innot microcomputer users are not unionised. So if you want to buy a micro with 'good ergonomics', you've got quite a lob on you'r hands. More fundamentally itasks at a micro often differ from those at a mainframe terminal. Before you go any further, then you should establish just exactly who this micro you want is destined for

hunt around for a model which can switch the characters activated by its keys from one language to anoth it

f you've got kids, you might want to lash but on NECs PC 8001, which can turn a whole QWERTY board into an ABCDE one f you're after a compact desklop or pocket machine you'd do well to remember that the size of its keyboard will make repeated use a hassle unless your hands are part cularly delicate, and yould do well to remember too, that the cramming of lots of functions on to each key has its disadvantages (unless the manufacturer has arranged for you to be fold what 'mode you're in very carefully preferably by giving your cursor different shapes you'll find yourself making mistakes). And if you're buying a micro for somebody as a present and you fee generous enough to pay for colour graphics, check that somebody isn't colour

biind getting on for one man in ten has defective colour vision

Get the picture? A lot depends on you. Take VDUs, is the VDU you want going to be used in a factory, by any chance? If it is, make sure it doesn't pull in cooling air over its screen and so make viewing aid rty business. Is it going to be used in American banks (which are very brightly lit) or in-Scandinavia winters (in which the sun barely rises above the horizon)? Alternatively take pointing devices. If you must point, you'll find that cursor step keys are too slow and that they don't work with graphics, but if you want to point on board your racing yacht. you might find a light pen a bit hard to handle. Your best bet is probably a 'mouse a sensor based device you roll around on your desk to tell your cursor where to go. It's handy and soon becomes an extension of your arm, though few companies offer such a device

The best way to set about buying your micro is to think about what you re going to use it for. And when you try one out follow the kind of routines you dibe using if you bought it – don't follow demonstration programs. Needless to say your most successful gambit is kely to be finding a friend who has exactly the same preoccupal ons as you and who has already got a micro that works like a dream

Clarifying your context

OP

be

Sorting out who you are and what you want to do only requires intelligence. Sorting out

the environmental context for your machine requires either DIY skills and a healthy bank balance (if you're computing at home), or a fair amount of clout with your office service manager (if you're computing at work). The recommendations below apply to maintraine term hais under heavy operator load because working with minros shit generally as arduous as this your be doing very werely your manage to full half of them.

Lighting Turninal on levels of 400 in x are about right. Much lower than this makes for

GOOD DESIGN



high contrast on-screen but an atmosphere

higher and would as place

au stie much

Giare, shield overhead lights with grills make sure they run parallel to your line of sight and put them forward and about a metre either side of you. Avoid the combination of dull background and bright spots on source documents. Line the side of your VDU up parallel to your windows and put a screen behind you. Go for matt finished grey furniture and buy yourself some roller binds or, better, those trendy looking curtains that come in the form of separate, butf-coloured strips of fabric strung out in lines. Set contrasts between screen, documents and background in the ration 1,3,10.

All the machines featured here have been noted for good design in the press. Left hand page from top Compass Gnd, Corvus Concept, Hewlett Packard 125. This page DEC Rainbow, Olivetti M20

Mode: Commodore 64 Commodore il	Manufacturer Commodore	Designers Porsche Zell am See West Germany
	Convergent Technologies	ID Two. Palo Alto, California. consultants, Mike Sanders et a in-house
Ra nbow	Digital Equipment	In-house team
Compass computer	Grid Systems	ID Two. Paio Alto, California
HP125	Hewlett Packard	In-house team
BM Persona. Computer	IBM	In-house team
PC-8001	NEC	In-house team
Nexos 2200 word processor	Nexos	Satherley Associates, London
M 20	Olivell	Ettore Sottsass, Tony Maccia-Cass Milan
ACT Sinus 1	Sinus	Peler Senhal et al in-house
Ser es 6000	Racai	Crisp & Wilson London
8010 Star Information System	Xerox	David Cantield Smith Charles Irby Ralph Kimball Ball Verplank Eric Harsiem (in-house team)

Humidity, room temperature, noise notal air conditioning if you can alford it but don't let it make the room draughty. Don't let the room get hot and dry respectatly if you wear contact lenses. Soundproof or if possible remove any peripheral equipment (especially if if gives out more than 65dB). Put carpets curtains makesh it baffles (bookshelves, cupboards) and above all three-dimensional celling coverings everywhere to absorb noise, this is particularly necessary in open-plan offices.

Posture, work organisation, etc. nyest in a good office chair. This is essential. There is a survey of some of the models on the market in the April 1981 issue of Design magazine. The angle and height of both seat and backrest should be adjustable especially if more than one person is going to have use of them (which s why quick-action gas-operated chairs make a lot of sense). Seat height should be about 40cm or more, the backrest should be 50cm long and angled back a good 20° from the vertica. Adjustable desks (including electrically adjustable ones, such as those recently brought out by ITT) are available try to get a thin one 70cm high or 17cm above your knees when they and your hands are in a horizontal position (which is the position they should be in). If you're small you may need a footrest

Learn to touchtype, put a good 50cm between your eyes and the screen, make sure that the screen is set at right angles to your line of sight, and place it 20" below the horizontal. Buy an adjustable document-holder that holds sheets 5cm above the worktop, place it next to the screen at an angle of 20° to the vertical, or, if you find you're changing documents frequently, site it between keyboard and screen, to one side, and at an angle of 65° to the vertical.

Maximise desk storage space and keep wiring out of the way. Put both VDU and documents within a 35° arc around your line of vision. If you re doing a lot of keying using 10 lingers, place your keyboard parallel to and 7cm from the edge of your desk. If you're flipping through documents and entering a lot of figures, put your documents at a slight income to the desk, shift the keyboard to the right (presuming you re right handed) and use your hands independently. If you're doing a little keying. and a fair bit of writing at the same time keep your documents flat, use both hands independently and splay both documents and keyboard 17cm away from the edge of the desk. Make sure your clear working area is at least 60cm wide and 90cm deep

Personal tips: take frequent rests they can be of short duration, but take them before you get tired, not after. See an optician – perferably one who knows about VDUs, and, if possible, one who s prepared to come and inspect your set-up. Remember that reading glasses aren't suitable for the half-metre distances you libe working at Try to work from high contrast, high readability, high regibility documents. Decorate your room with soft, dark colours.

unless you re doing a lot of repetitive work in which case soft cold colours and a few dashes of brightness are best. Try not to drink too much, and lay off the lags, valium, etc. too.

The right kind of micro

Now for the moment we've a been waiting for – the ergonomics of the micro itself. Once again the recommendations here apply to mainframe term hais in the first instance and micros only in the second.

Keyboards, they should be detachable with thin flexible cables of reasonable length (keyboards that work via infra red remote control do exist). They should have some factity for attaching strips of paper or card with function identification on them. They should be easy to move about intentionally and hard to move unintentionally (footpads are useful here), have their home keys 3cm above the desk, and be inclined to the horizontal by an angle of about 10° Like everything else on the termina, their surrounds and their keys should be mattfinished in grey. Key rows should either be stepped or sculptured so that the upward curvature of the board follows the radius of your fingers. For number-crunching applications they should be supplemented by a numeric keyset. There should be some acoustic feedback to let you know when you're stroking, and tactile feedback should be arranged so that the pressure and depression needed to make an input are greater than those needed to release a key



GOOD DESIGN

nonclusion only as far as micros go. If the history of trade union pressure on maintrame buyers and maintrame buyer pressure in maintrame manufacturers is anything to go by the days of poorly designed micros are numbered. All that sinceded is for microuse is to become as demanding about ergonomics all they are about software Home microusers won't even need to the opening development. Maggie's mag.

The VDU and the display itself you should be able to titl and swive the VDU at will and you should be able to vary its height by at least 10cm. Phosphor. president of ould be high to minimise. flicker. Screens can be any colour, though most people prefer yellow phosphor and amber filters. Refreshirate should be constant and as high as 80hz if pos. () Bit-mapped d splays - in which every dolcan be individually turned or lind off by memory - are the best way to improve definition (the alternative interlacing scarin a riedreases refreshitates) and are word a for the reproduction of multiple tents and for variable line spacing.

Glare is best reduced by black net filters

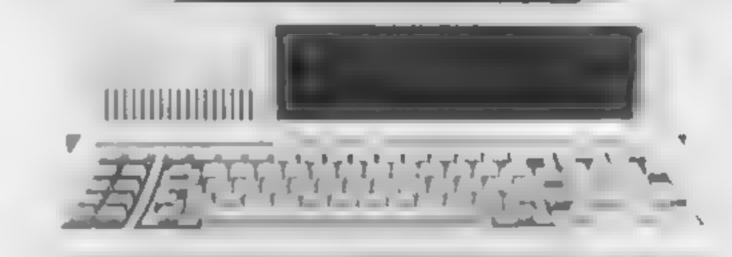
1 - umination levels of more than 500 lux, or
by a loughened CRT at levels below this.

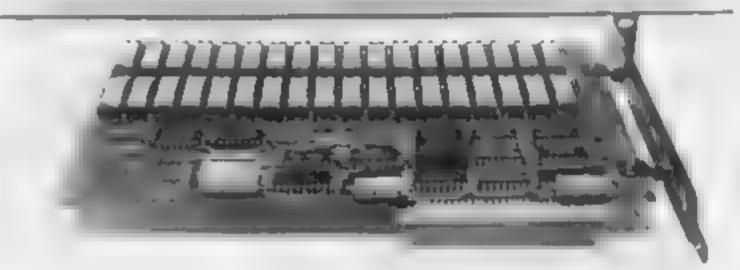
Character are an eighbourd below this but range around 150 n ts. screen are raises should be a good 10 n ts.

The ergonomic leaders

So who are the micro manufacturers whose machines begin to measure up to the specification (sted above? Peter Senhal Vice-President and co-founder of Sir us. Systems Technology Santa Cruz, California The recent arrival of third generation, 16-bit micros from companies like Sirius. Digital Olivetti and IBM has been accompanied by a new emphasis on the needs of the continuous users, whether he be fanatical home hobbyist or normal, ground-down office worker. I admire the ergonomics on a those firms machines. Bul if you go to second generation, 8-bit micros such as hose made by Apple Afair Texas NGC Toshiba or Hitachi, you re really talking. about toys "

satisfactory micros are those which are most up-market (surprise, surprise). Here's a list of some of the front running mode's





tie tims that make " or and the design teams that put them together

Conclusion

Early or riths at a painted out that eight comes solved that fart single solved one

malker forces will see to inflam run larger reinvestment in good ergonomics is rewarded directly by sales in the shops

Evel ght y used 8 bit ruch resire in the upgraded considerably at little extra rios. It is time micro users started voting or ergonomics involving with their feet.

Free with every Commodr



dore word processing system Your secretary.

Daft, isn't it?

You ask your bright, competent, wellpaid secretary to type a letter or a report for you.

And then what? You get her to type it again. And again. Possibly again.

Perhaps you've had second thoughts. Added a paragraph here. Changed a sentence there. Or maybe the same document has to be personalised for umpteen different people.

All this is mind-numbingly boring for your secretary, and an utter waste

of time and money.

But now you can set her free.

A Commodore word processing system will transform her life and your business.

By taking over those repetitive, lengthy, mechanical operations of typing, retyping and all that goes with them, a Commodore word processing system will release your secretary and other members of your staff to take on new work. To assume new responsibilities.

To help make your business more efficient.

The system produces letters

and reports, word perfect, faster than you'd have thought possible, and provides excellent facilities for text

editing and document storage.

For solicitors, insurance companies, and anyone who has to produce standard documents, Commodore word processing systems are invaluable. Tedious typing is a thing of the past – even if an entire report has to be revised. [Small wonder that many authors would be virtually lost without them.]

Mail-shot letters can be personalised with little more than the touch of a key. Reports to directors run off with ease and complete accuracy.

And amazingly, a complete Commodore word processing system

only costs around £3,000.

Our computers, peripherals and comprehensive range of software, backed by our countrywide network of expert dealers, have earned us a high reputation among the many people who have looked to us for advice.

We think you'll be impressed, too. Ask your secretary to call us, or drop us

a line.

If she's not too tied up, that is.

(z commodore

Changing business for the better.



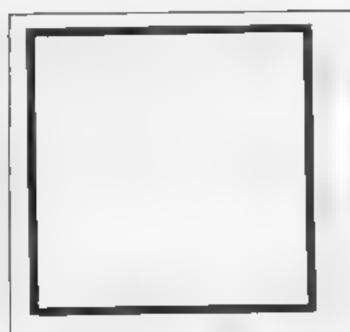
For more information, and the address of your nearest Commodore dealer, contact. The Commodore Information Centre, 675 Ajax Avenue, Slough, Berks SL1 4BG Telephone. Slough (0753) 79292.

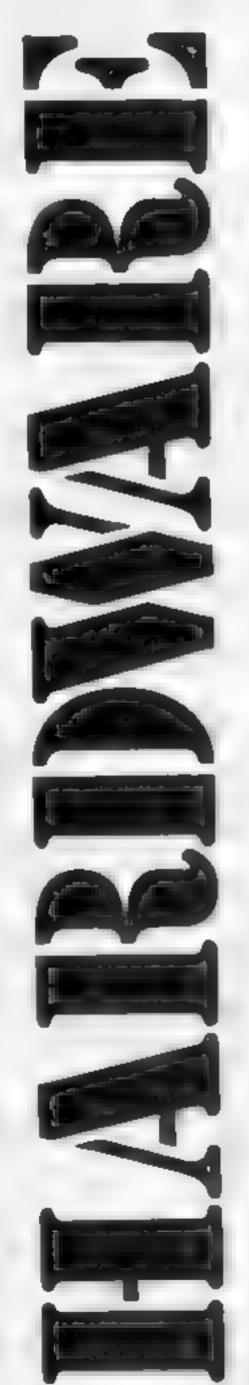
NAME (MR/MRS/MISS)

ADDRESS

TELEPHONE

40MC209-82

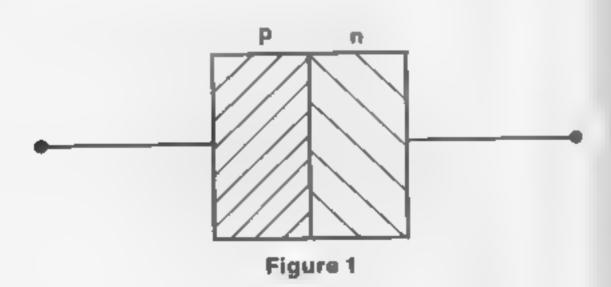




If you open the lid of your computer, you will see a large number (or possibly not a large number if it is made by Uncle Clive), of black objects known variously as ICs, chips or beetles. We have already looked at some of the smaller ones, which are called gates, but in this article Chris Preston investigates some of the larger devices which go to make up a computer.

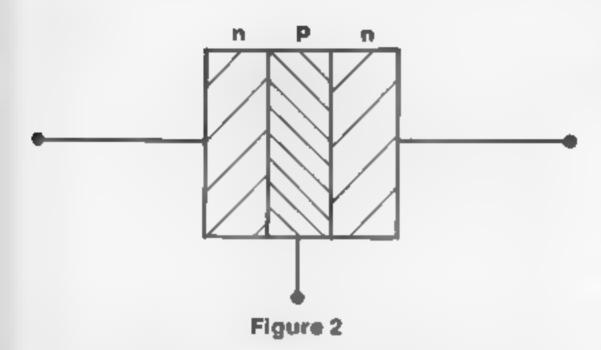
One way to think if the nicips is a labour-saving devices for proof an mery. If my perform on I functions which can be tone in software. It for a soft they work a lot laster than all y program.

Before well mixalist sind tails by littles tight on the winder of the actual ymalist who can darkly enking at the amplest actual ymalist who can darkly enking at the amplest actual of the darks of the transfer of the trans



By sar dwiching a piece of pitype slicon between two pieces of nitype, we get an inpnit ansistor.

MADISIAS



Transistors and diodes can be connected together to form any of the gates, we have previously talked about

oning different pieces of silicon together, but instead by a processicalled diffusion, where we start off with a single piece of silicon and build up a pattern of impurities which produce the circuit we want. By varying the pattern we can build up a circuit — in just the same way as would be possible using discrete components soldered together with pieces of wire. We can in fact produce almost all the components used in the electronics industry, but some are easier to produce than others.

How do we control which impurities go where? Well the process used is very similar to that used by an engraver. He covers his piece of metal with a substance called a resist which is not affected by the acid he is using. He then draws a picture by scraping laway the resist to expose the metal underneath, which is then attacked when the engraver immerses the plate in the acid.

When an integrated circuit is manufactured, the surface of the silicon is covered with a "photoresist", which is sensitive to light just like a photographic emulsion. The manufacturer then exposes the resist to a light shining through a "mask", which is a negative of the pattern he wants on the silicon. The parts of the photoresist which have been exposed to the light are chemically altered and can then be removed with a solvent, which reveals the silicon underneath. The whole piece of silicon is then exposed to the impurity required, which diffuses into the exposed areas on the chip. By repeating this withid fferent masks and different impurities the manufacturer can built up the circuit he wants.

There are, in fact, many other ways of introducing the required impurities, and other processes involved in the manufacture, such as connecting wires between the chip and the outside world, but you will have to make do with that for now if we are ever going to get round to looking at some real chips.

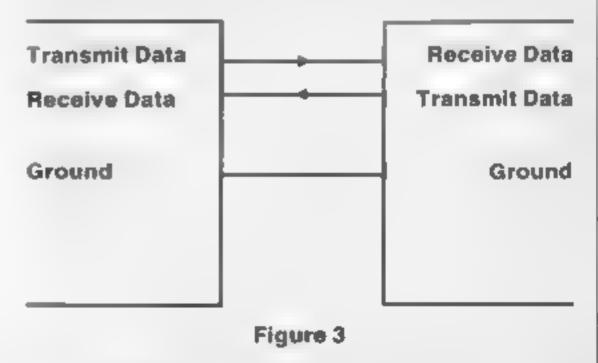
Communications Chips

Back in the bad old days if you wanted to get two computers to talk to each other, you had to build an interface, which could be a box the size of a present day microcomputer. The introduction of large-scale integrated circuits has meant that the entire interface is now built on a 24-pin chip which can be tucked away inside the computer. This means that most microcomputers either have comms facilities as standard or as a fairly cheap add-on.

The most common standard for communications at the moment is RS232, a though there is a good deal of variation even here. A new standard has just been announced, the RS423 which offers great advantages over RS232, such as increased speed, increased distance between stations, and better noise immunity. Already one microcomputer, the BBC microlihas an RS423 interface and it looks certain to be very popular in industrial applications where electrical noise from machinery is a problem.

Because RS428 is not yet terribly common, we will only look at the RS232 standards here. Two typical chips are the 6850 (Asynchronous Communications Interface Adaptor or ACIA) and 6852 (Synchronous Serial Data Adaptor or SSDA) from Motorola, a though just about every majorich pimanufacturer produces a communications chip of some sort.

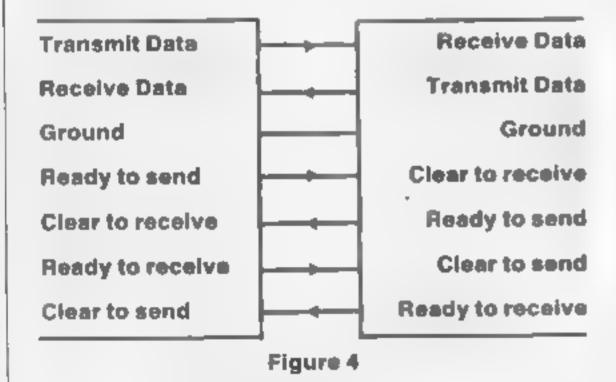
The job of the comms chip is to convert bytes of (parallel) data from the computer into a string of (ser at) bits which can be sent down a wire to a per pheral or another computer and to receive serial data from the other station and convert the data back into parallel form for the computer. The simplest form of RS232 interface is called a 3-wire interface, because it consists of just 3 wires. Two wires carry the data, one for transmitted data and the other for received data, while the third is just a common or earth



The problem with the simple 3-wire system is that the receiver may not be ready to receive. If it is a printer it may be



out of paper, for example or if a computer, it may be busy doing something eise. Similarly, the transmitter may not have any data to send, which means that the receiver may waste a of of time waiting for a message which will never arrive. To get round these problems a normal RS232 system has additional lines, called handshaking or control lines, which in effect say, "Yes I am ready to receive", or "No, I do not have any data for you"



A I these lines go into the communications chip on the interface side of the system. From the processsor side, the chip will look like a number of registers. There will be one or more control registers, a status register, a transmit register and a receive register. Let us follow the steps a computer has to go through to send a message to say, a printer. Firstly, it has to set up the chip according to the protocol expected by the printer. For example, different devices communicate at different speeds (baud rate) and have slightly different formats The processor then has to tell the chip to raise the signal line which says "I have data to send". In the status register, one of the bits will correspond to the line from the printer saying whether it is ready to receive or not. The computer should test this bit to make sure that the printer is ready. There is another bit (transmitter ready) in the status register which tells the computer when the chip is ready for another byte of data. As far as the computer is concerned, the chip takes quite a long time (say 1 30ms) to send a character, the computer, which can send a character every 5 or 10 microseconds, has to spend a lot of time waiting around for the chip to finish sending the previous byte

In addition to all this, the comms chip can also be programmed to do a certain amount of error checking, using a systemicalled "parity". If we take a byte of 8 bits, and count up. how many "ones" there are, we will get either an odd or an even number, and so we say that the byte has either odd or even parity accordingly. If we are using a parity checking system, we will add an extra bit, making 9 in a l, so that the group as a whole always has the same parity. The receiver checks the parity on each group of nine bits it received, and if t finds that the parity of the group is wrong, then one of the bits in the group must have been corrupted during transmission. There is a bit in the status register to tell the receiving computer that a parity error has occurred. Of course, I two bits are wrong then the parity will be right again, but you cannot expect perfection from such a simple system, and two-bit errors are much rarer than one-bit errors

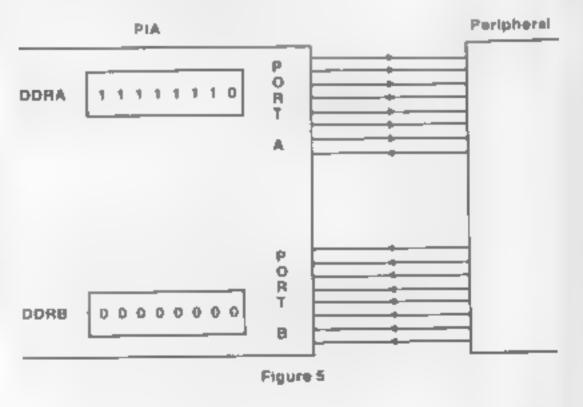
So we can see that the communications chip has a lot of work to do converting data between serial and paralle forms controlling data flow by means of handshaking lines, passing status information to the controlling computer and checking for errors

Parallel I/O chips

Now we move from serial to paralle I/O. As with the previous section, there are a large number of chips to handle these functions. Probably the most common are the Motoro a 6820 (Peripheral Interface Adaptor or PIA) and its equivalent the MOS. Technology 6520, and the 6522 Versatile Interface Adaptor, VIA.

There are almost as many uses for parallel I/O chips as there are functions in a computer Internally, they are used for controlling lights, reading keyboards, turning on cassette motors, even sending data to and from the cassette tise fi Externally, the Centronics standard parallel printer port is often controlled by a PIA or VIA as is the User Port on the Commodore range of computers

Starting with the PIA which is somewhat simpler, we find that the chip has 16 I/O lines, each of which can either be an input or an output. This gives added flexibility compared with the older Intel 8255, where the lines can only be programmed as inputs or outputs in groups of eight or four. If we want to use a VIA to control a piece of hardware which has seven inputs and nine outputs, we could program seven bits of port A as input, with the last bit together with the whole of port B set to output. This is done by writing values into two registers called Data Direction Registers.



If we read the value in register A we get ones and zeroes corresponding to the lines of port A. We say that these lines are level controlled. In addition to the 16 lines in ports A and B there are four control lines, CA1, CA2. CB1 and CB2. These inputs are called edge triggered inputs and they work sightly.

differently if the CB1 input is set up to detect a positive transition, then the chip will set a bit in the control register B when the ine goes from a 0 to a 1. However, even if the CB1 input goes low again, the bit in the control register stays 1 until the processor specifically clears it. This is useful if the pulse we are looking for on the CB1 line only lasts for a short time. If we tried to use a level input, the pulse might go past while the processor was doing something else so that we missed it completely. In addition, CB2 and CA2 can also be programmed as outputs.

A VIA contains all the features we have just described for the PiA but with lots of new things as well? It has two 16-bit timers, which can be used for a wide range of tasks. If we store a value into timer 1, then the chip will immediately start to decrement the value, and will signal the processor when it reaches zero. Say we want to do something every 1/60th second, such as scanning the keyboard on our PET. We set the timer to the required delay, and every time the timer reaches zero, the VIA will interrupt the processor which can then scan the keyboard, update the internal clock, sing "Rule Britannia" or whatever else we want.

Instead of interrupting the processor, the VIA could give alsignal on one of the output lines. In this way our computer can give an accurately defined series of pulses to a peripheral, without tying up the processor at all! We can also use one of the timers to count the number of pulses coming into the chip on a certain input lagain without wasting any processor time.

The VIA also contains a "shift register" which allows the device to convert data between senal and parallal format. It is not specifically designed for RS232 use as are the communications chips we discussed earlier, but it can be used for senal communications within a computer system.

Video Controllers

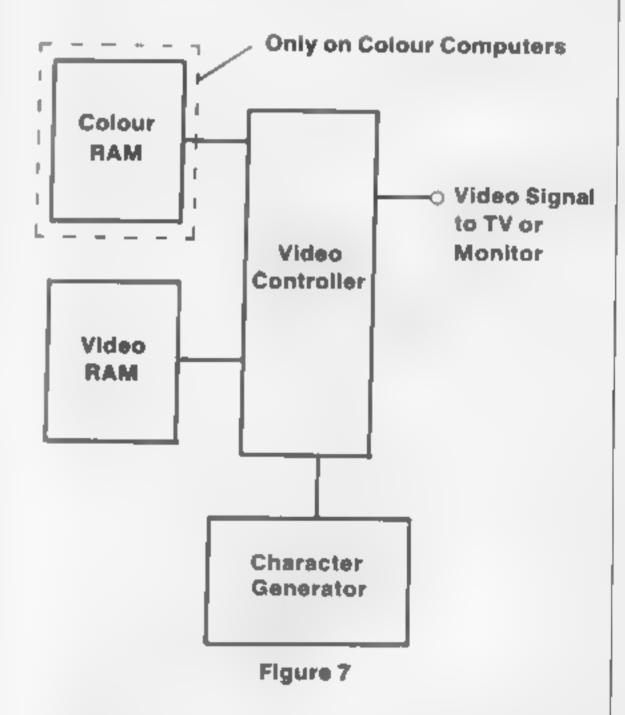
One thing every computer with a screen has in one form or other is a video controller. It is the job of the video controller to turn an oddball collection of numbers inside the computer into a recognisable disp ay on the screen. Video controllers, which are quite used to going about their business quietly and out of the public eye, have recently-been very much in the spotlight with the introduction of the VIC (Video Interface Chip) which features prominently in the computer of the same name.

The most important job of the video controller is actually forming characters on the screen. A character is displayed as a pattern of dots in a square or rectangular matrix.

0	0	0	•	0	0	0	0
0	0	•	•	0	0	0	0
0	0	,	•	0	0	0	0
0	0	Ö	•	0	0	0	0
0	0	0	•	0	0	0	0
0	0	0	•	0	0	0	0
0	0	•	•	•	0	0	0
0	0	0	o Figu	o ire 6	0	0	0

Our "typical" computer uses an 8x8 matrix, because that will make things a little easier later on If we represent each light dot by a "1" bit, and each dark dot by a "0" bit, we can store the representation of the character as a group of 8 bytes. These representations, one for each possible symbol which can be displayed on the screen, are stored in a ROM inside the computer called the character generator ROM Now we know from our BASIC programming that each character has a corresponding code which we can find out using the ASC function, in the range 0 – 255 Say, for n-stance, we want to display the character "A" The code for "A" is 65, and each character occupies 8 bytes, so the representation to "A" starts 65 x 8 = 520 bytes into the character generator ROM

Here is a diagram of the video system of a typical computer

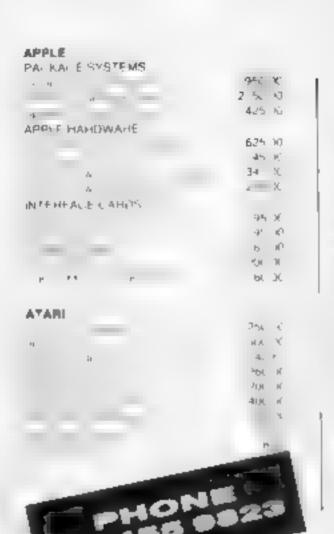


The video controller chip is continuelly scanning the video RAM area. It looks at a location, picks up the character code and uses it to find the 8 byte character representation in the character generator. It is able to use this to generate the correct pattern of light and dark dots to feed to the video output signal which eventually produces to picture on the screen. If the computer has colour facilities, then the video controller also has to pick up colour information from the colour RAM at the same time as it gets the character code from the video RAM. All in all, the video controller is quite a busy little chip!

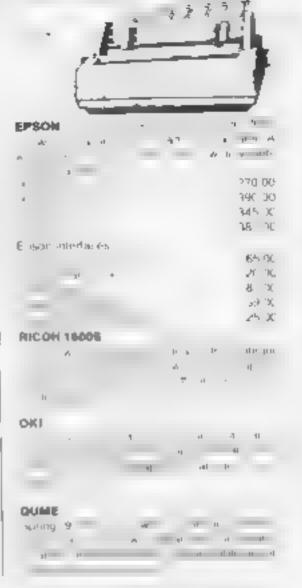
There are many other groups of interesting devices. A/D and D/A converters, speech synthesis chips, modern chips and solon, but these tend to be specialist devices, which are really outside the scope of this article. However, as these chips become more common in the personal computer market, we will keep you up to date on what they do and how they work.



TEACH YOURSELF COMPUTING







the to it is ANI At employing it injures on the investment rectors the properties are of entirely Temperathermanys as 18 1 was when distributed

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pley outly by the your Cassette One and consider the be good value for money

Richard Russ Langrey Maragen Juster Mine of Information Ltd

CASSETTE 1

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machine code

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IChing Mastermind Robo's Basic Hangman PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k. Cassette 1 costs £3 80

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pernova STARTREK This version of the well known space. adventure game features variable Klingon mobili ity and graphic photo torpedo tracking. .

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An adventure game

BATTLE Strategy game for 1 to 4 players. KALABRIASZ Words silest card game full of

pc-11 ess complicated fules CUBE Rubik Cube simulator, with lots of func-

tions including Backstep' SECRET MESSAGES This message coding program is very tx bigex if

MARTIAN CRICKET A simple but addictive game. totally unlike Earth cricket) in machine code The speed is variable, and its top speed is very

pet of an in the set.

Cassette 3 costs £5.

CASSETTE 4

8 games for 16k

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machine code)

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FUNGALOIDS machine code

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Which Application?

Business Briefing is a new series for businessmen and professionals who 'think they need a micro' but don't know what to buy. In the first article Charles Christian looks at the most popular applications and how to make up your 'shopping list'.

If over the last few months, you have been reading this magazine as carefully as the Editor hopes, you must by now have grasped a reasonable idea as to what microcomputers are all about

No longer should you flush with embar resement when the conversation turns to talk of "VDUs" "ROMs" and "RAMs" No more do you ponder why anyone in their right mind would want to buy a disk that has gone "floppy" Nor for that matter, do you believe any longer that the "si icon office" is just another name for the National Coal Board's headquarters indeed if you have been particularly diligent you may have even reached the conclusion that a microcomputer could have a valuable role to play as a business machine in your own office.

But whilst buying computer hardware is an saue that seems to be discussed endlessly that is only half the problem. For unless you are a budding "mastermind" and can write your own programs, you are also going to have to buy some actiware if your system is going to be of any use.

And this is where the difficulties start, for in the UK today there are estimated to be over 1,000 different software houses and dealers seiling literally hundreds of different types of program.

Obviously a microcomputer is not some thing that needs to be confined to a corner of the wages department and only used once a week when Dons runs off the factory payroll. On the other hand it is courting disaster to go out and immed ately buy every program you think may be of use, as you will rapdily find yourself being submerged in a welter of paperwork as your computer spews out useless report after useless report.

There is therefore a real need to strike a happy medium with the software you use, but just how do you set about separating the wood from the trees, or in some cases the grain from the chalf when it comes to selecting business programs? Naturally any final decision must always be determined by the particular needs of each individual company but it is possible to detect some general trends as to the way microcomputer users

select their first software packages, which could usefully be followed by others

Given the present state of the UK micrecomputer market, there is still insufficient data to be able to categorically state which individual software program seems to self better than others. Consequently, for the purposes of convenience, I have grouped together business software programs into six basic categories. These are, in alphabetical order.

> database management financial planning

- general accounting
- professional applications specialist programs, and
- word processing

Before going on, for the benefit of the unintrated, to a more detailed discussion of each of these categories in turn, I would just point out that I do appreciate that this classificial tion omits what are probably the most widery used software programs in offices today. Untortunately, despite the popularity of PAC-MAN and BREAKOUT and others of that lik on computer terminals up and down the length and breadth of the country, games packages do not qualify as genuine business software.

Database Management

Despite its rather awesome sounding name a database management software system (you may also see it referred to as "information management"), is in fact a relatively straightforward concept

It can probably best be understood if you think of an electronic library or hing cabinet. Thus, the software is structured in such a way that vast amounts of information can be recorded and stored away, with each item of information only needing to be recorded once. This constitutes the database element. To this is added the management element whereby the program contains an elaborate cross-referencing or indexing system. The end result is the creation of a pool of information to which the computer operator has ac-

cess and can draw upon in any one of a number of different permutations

For instance, one company with which am 'amiliar is in the business of supplying fresh produce to some 1500 automatic vending machines in the Thames Valley and Home Counties area. On its database the company's computer records such information as the locations of all the machines, their distances from the company's service centre the type of produce they sell, their best selling lines at each site and their relative pro-

When it comes to plotting a supply rota for the machines imanagement consequently has a number of options open to them Machines could be supplied on a straightforward geographic basis, which would probably be the most obvious. But it would be just as easy to draw up a rota where the crucial chieflon was the size of the weekly takings of even the number of "Mars Bars" sold each

Admittedly such an application may be rather too sophisticated for the average first-time computer user to begin with, but a database management system can still have a valuable role to play, even if it is going to be used for far more modest purposes. For example, many companies, before they have got their accounts fully computerised use it supplied with information drawn from their books and ledgers to produce management reports such as listings by age of creditors and debtors.

Financial planning

Financial planning (sometimes called "financial modering", "what-if programs", "cash flow forecasting" and even the "electronic spreadsheet") is the generic term used to describe the increasing number of programs coming onto the market on the lines of *VisiCalc* and *MicroModeller*

Basically financial planning is a computer tool for calculating the effect changing certain variables would have on a business situature. For example, what would happen if the pince of petrol went up to £3 per gailon. VAT increased by 5% or basic rate tax was cut by

5p in the pound?

By using financial planning software it is possible to follow hypothetical changes in these variables through the whole gamut of your budgetry process. For instance an increase in the rate of VAT will mean an increase in the sale price of a product, which will usually mean a decline in the volume of sales. This in turn will mean that cash income falls, stock levels rise the overdraft grows profits fall away and the directors don't get their bonuses at Christmas. Armed with this dismail information you will at least be able to draw up contingency plans to minimise the impact of any such changes.

Obviously the effectiveness of such a program will very much depend upon the ac curacy and the quality of the information you originally feed into the computer to act as the basis for your assumptions, and for this reason many computer users tend to employ financial planning as an adjunct to an established computerised accounting system.

General accounting

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General or "integrated" accounting systems are according to a recent survey the most widely available of all software programs currently for sale on the UK microcomputer market. The reason for this being that almost every bus ness organisation in the country is a potential purchaser of such a system.

Most accounting systems tend to be mod war in construction, so that they can easily be adapted to meet the individual needs of different purchasers. The reason for this is that it is a complete waste of time having an elaborate "payroll" program in operation if your company only employs a handful of staff each of whom is paid a monthly salary by cheque. On the other hand, if your business has severa, hundred employees on its books all of whom are paid weekly in cash and whose wages vary greatly depending on the number of regular and overtime hours they put in then some form of automated payroll facility within the system would be a necessity. Calculations of tax and statutory deductions and special rates of pay, the completion sips and even the production of coin analyses to speed up pay packet prepara

For most businesses, the core on an accounting system will be a "bought" or "purchase" ledger program operating in conjunction with a "sales" ledger. These in turn could usefully be appended by "stock control" "order entry" and "invoicing" software so that cheque issuing statements, sales analysis credit control. VAT cash flow and account posing work can all be processed speedify and with a minimum of effort. As already mentioned, it may also be appropriate to add payrol work to the list of tasks undertaken by computer.

Once such a system is in operation most companies usually take the process one stage further by drawing it all together under one general program which can automatically generate trial and nominal balance sheets and profit and loss accounts, as well as the other management reports companies need from time to time

The beauty of such a system is that the data needed to generate such reports can automatically be drawn from the sales and purchase programs, hence the data only

needs to be entered once. A factor which can considerably cut down the possibility of errors being made. An additional attraction is that the data produced by a general accounting system is an ideal source of raw material for database management and financial planning programs.

Professional applications

Whilst a general accounting system will meet the computing needs of most commerce and industrial concerns, there are still a number of individuals and businesses in this country, most notably members of the professions, whose work, or the formal regulations of their professional bodies, means that they are looking for something more from a computer

Solicitors, for example, because they handle very large sums of money belonging to their clients, are competted to comply with The Law Society's very stringent Solicitors Accounts Rules when they prepare their books and ledgers. With chartered and certified accountants, however, their problem is not so much the requirements of their profession as the practical ties of their work as, for example, one of their biggest headaches is the auditing of accounts for clients based upon "incomplete records"

To meet the needs of such people in recent years a thriving industry has grown up supplying off-the-peg software programs for professional applications. Currently one of the most popular of these is the "time-recording" system for the benefit of individuals and organisations that offer a service to a client rather than a product to a customer. Users in clude accountants, solicitors, architects and surveyors and a typical system would produce a record of hours spent and the amountof fees earned by different partners carrying out work for different clients.

Despite the fact that many of the professional applications cater for a relatively small section of the community they tend to be proportionally more popular than more general software programs, precisely because the people using them are usually more conscious that as "time is money", non-rechargeable administrative work should be kept to a minimum

Specialist programs

Although most first-time computer users withind that their software needs can be satisfied by widely available off-the peg programs there are some businesses with rather more special stineeds.

These in turn can effectively be sub-divided into three further categories -

specialist software programs, such as "printers job costing" for example. The drawback with these, however, is that there may only be three or four suppliers handling it within the whole country, which can lead to maintenance and back-up problems.

- users whose needs are not quite met by offthe-peg programs and who may require some elements of "tailoring" to make the software compatible with the way they run their business in practice this sia fairly common requirement

- Users whose needs are riterally unique and who require "bespoke" software to be written specifically for them. The major difficulty with this option is that it can be prohibitively expensive.

Before selecting any of these options you must weigh up all the cost and inconvenience factors involved most carefully Indeed some businesses find that it is easier in the long run to adapt their own administrative systems to run on a general purpose computer system rather than try to get a software



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Which Application

program custom written to meet a more specific need

Word processing

Lastly but by no means least, there is the option of purchasing word processing (some times called "text ed ting" software. In a nut shell, word processing is computer-enhanced typewriting.

Instead of typing directly onto paper, a text sientered onto a word processor and displayed on the VDU. Once there it can be edited, drafts can be printed off for approval and the text can be stored in the system's memory. Hours, days or weeks later the text can be retrieved and further amendments deletions, substitutions and re-arrangements of layout can be made before any number of lop copies can then be run off for distribution.

As such, word processing holds a considerable appeal for business and professional offices for instance those of solicitors, where long and complicated documents, such as contracts and conveyances may go through many stages of redrafting or contain many

standard paragraphs

An even greater potentia, can be realised business software programs currently availabie cari do. But in what order should a first time buyer rank them on his shooping list?

As mentioned earlier, the ultimate determining factor must be the particular needs of each individual customer. However, to get some idea as to what many first time buyers are currently doing. I contacted a number of different software companies and retail dealers around the country to find out what their experience was

In fact, despite the apparent abundance of outlets, carrying out the research proved to be quite a difficult task. Train strikes, annual holidays and heavy aguid funches appear to have taken a heavy toll of the industry. In deed some offices seem to have become the haunts of owl and bat" which is a smart aiick way of saying no-one bothered to answer the phone

The league table

Despite the surfeit of accounting systems on the market plus the fact that accounts work is one function that lends itself very easily to computerisation, the results of my survey show that general accounting software does

tol-based software house. Said Peter. "Most people can become proficient at word processing after only a couple of days training. but with accounts work, even if the system is easy to learn, it can still often take months to get it fully up and running. Businesses nowadays tend to use computers for several difterent applications and recognise that as they have to start somewhere, it is best with a relatively simple application like word processing that is easy to get going "

Buying a computer is tike getting married", Peter reckons, "it is best to iron out the wrinkles before you get hooked "

This whole phenomenon of starting with a simple application and then moving on to one more complex is probably best summed-up by the words of David Cater, a director of Computaline of Faling, West London, who hand eithe Sirus. He be leves that one of the problems many first-time users face is that they are daunted by the prospect of working with a computer "but if you let a customer loose on word processing the quickly mas lers it and thereby overcomes the mystique of the computer. Once that is done he is in a better frame of mind to start tacking accounts work and more specia st applicafions."

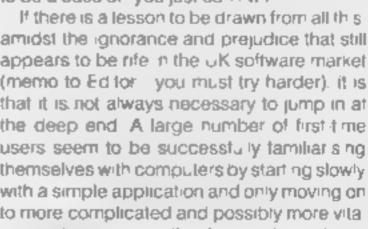
Key factor

One other point that was brought out during the course of my researches, most notably by Peter Hartley, a consultant with Stage One Computers of Bournemouth and Jim-Thompson of Commodore dealers The Microcomputer Centre of Sheen, South West London, was that a key factor in determining what programs software users select is "what stimulated them to come to the dealer in the first place"

The general concensus seems to be that about half of all customers have a specific idea about what they are looking for and have either read about a particular package in a magazine, had it recommended to them by a coxeague who has a similar system, or have responded to an advertising campaign Whether the system is appropriate for them or not many of these customers are intention buying one come what may

Quite a number of others tend to be people with a business problem but who have no real idea how computer sation can help them. They only know that it can because "this is information Technology Year and I heard about it on TV". Unfortunately anyone too vague about what they want seems to be equally difficult for some dealers to cater for. As one software consultant, who prefers to remain anonymous put it rather uncharitably "these people are a pain in the arse." Which seems to be a case of "you just can't win".

amidst the ignorance and prejudice that still appears to be rife in the UK software market (memo to Editor you must try harder), it is that it is not always necessary to jump in at the deep end. A large number of first time. users seem to be successfully familiar ang themselves with computers by starting slowly. with a simple application and only moving on to more complicated and possibly more vitaapplications once the basics have been mastered





Word processing is by far the most popular 'first' package

from a word processing system if it is combined with some form of indexed mailing list facility. A number of estate agents, for exampie, use such systems to selectively mail out lists of property to prospective purchasers Thus those of us who can only afford rundown sum lenements in Tooting with hot and cold running cockroaches in each room are not plagued with estate agents particulars of luxurious office accommodation in Goring

Even if you are unlikely to be able to employ word processor software in such an elaborate way in your office, it should not automat cally be ruled out as a possible option. Indeed, many business organisations have found that the investment in word processing facilities can be justified in terms of efficiency. no longer any danger of valuable drafts going missing, job satisfaction + no more secretaries tearing out their hair as they type out the same boring standard letters for the hundredth time, and general convenience even if they only have a fairly routine clerical work load

Purchasing priorities

So much for what the basic categories of

not figure very highly on most people a initiashopping asis. In fact the outright winner by a clear margin turns out to be word processing packages

The full league table is as follows:

- I Word processing, followed at some dislance by
- 2 Database management, followed closely
- 3 General accounting followed closely by
- 4 Financial planning, followed a long way behind by
- 5. Jointly professional applications and specialist programs

The reason for this, perhaps surprising, result was explained by Steve Johnson, a d rector of Johnson Microcomputers, who are Camberley-based members of the new ICL Trader Point Scheme Steve reckons that word processing and database management systems are popular "because dis possible to achieve almost immediate results with them "

This view was also expressed by Peter Wills of Mercator Computer Systems, a BrisTerry Hope continues his "Love At First Byte" Atari orgy, begun last month. This time it's a full-frontal affair including player-missile graphics!

Every magazille writer bears across what ever lie writes may we the clinicitiate by the time it gets read its happened to me this time but not hastly

By narrowing your eyes and looking very massely you may possilly have noticed that the been extoring Atar's virtues for some time now. This was based on its qualities considerable, facilities (amazing) and price treasonable.

It's the last of these that since to thump me for since my opening article in the len e. Atar is mysterious world without fear ise ics. Atar have dropped their pilles with what can cred by beidalled a crunch.

The Atan 400 is now an astonishing £ 199 95 and that siw this fig. 16k of memory while the up market Atan 800 is down to £499 and Atan disk drives are less than £300

They renot kely to get lower and knowing what's inside and what let you do I car they remained rightness prices. And as the been saying for months now it's what's inside that makes Atalisuch a creative computer.

Which brings melneatly to a continuation of where we got to last month

Display lists continued

display istillast time which let's us use a

number of different graph is modes a latorder on the same solve.

n does of that cand our example was a remarkable of the cand out example was a common of the world of the presumes involved.

Hopelusty you found display tists were nowheld hear as mysterious as you'd thought you may even have been soperad venturous and played around to set up some different and samples for your set.

at blank sections in different modes on the science and had algo at putting something in them.

And at that point you may have run into some difficulty.

try the screen divided into fun bars of different quaptur's modes, but there is not much pro-it on essible can actually put some hing useful here too.

Getting stuff on the screen

We you remember I said you could print or prot to a screen of mixed modes, ust so long as you didn't exceed the normal cursor range for the mode at which you were aiming.

went on to say you could find the vertical position by counting the model ries from the screen top

The horizontal position you find in the usual way for the graphics mode you vertargeted.

by and no from the left after checking his will make her zerotal to a nos year and a common that mindo

of a 15 year, if y we are discovered) the arc the silent of the year 1 which you want to print or plant as parts 1 in the 2'r and read to cared Milliphy Shaw are after easy, and able things

So what's the abswell to 2 Parana Apart for its force you want and poker; the otermal on A reliable, what we reight took at now him or starting rious, a year to segretable.

Where on the screen?

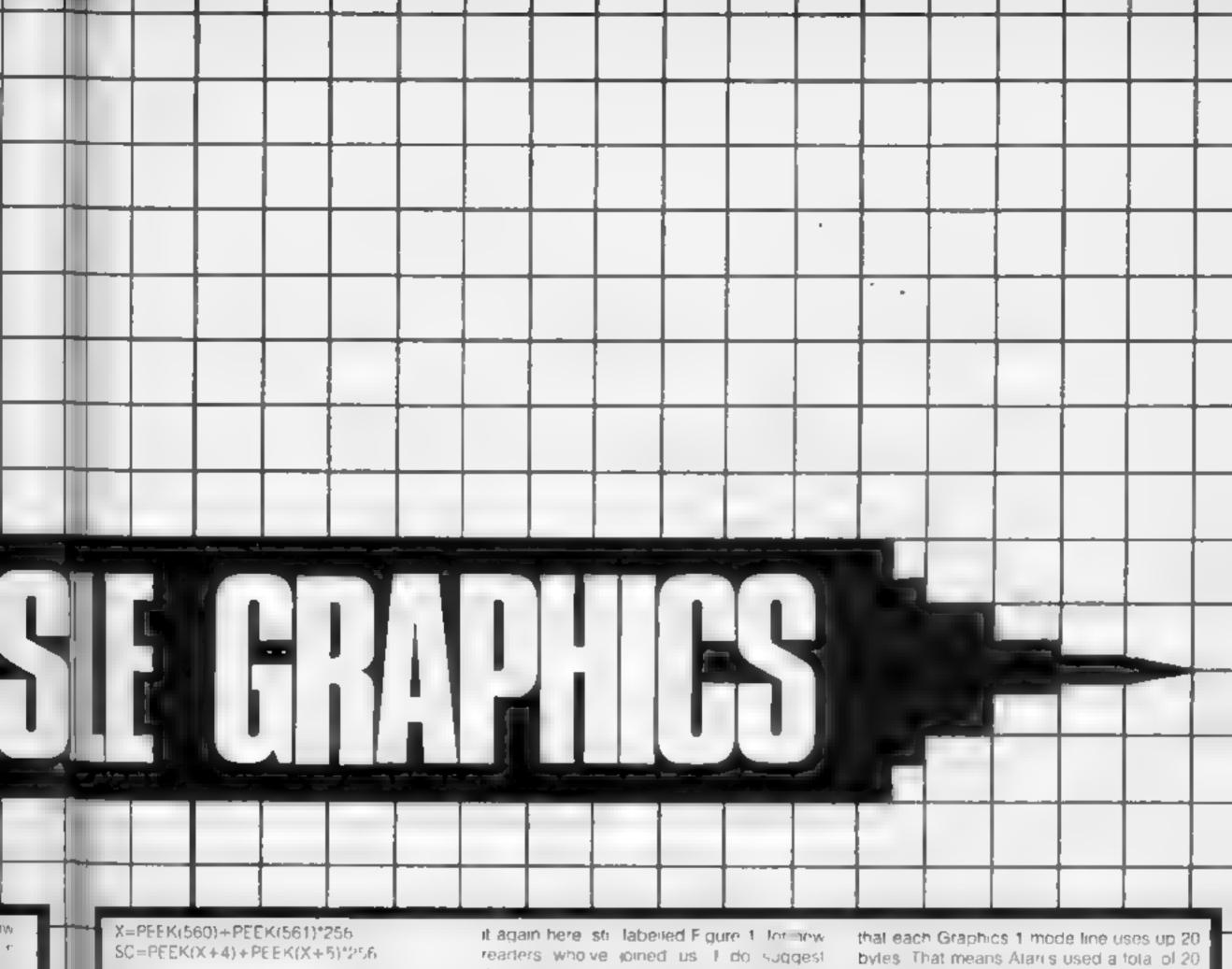
The tist thing you have to consider work out the memory admissistrom the top left in it is een colorer.

you very a coring on lend spay so you very a tiple

If we call the memory address SC (for someon corner is soperated still eh?) there are actually two ways to get the number you need by the second is almost a ways quickest

give you both though because vinever know there might come a time when you want a change

Here's the istards giy noge way



Now here is the one-line method of getting the same result

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Whichever method you use you it finish apwith SC equal to the memory address for the top left hand screen corner. Painless so far

How much from here to there?

The next job is to work out how much memory will be used between the top left hand screen comer and the place on the screen yould quite like to have something appear?

Now this does appear a bit complicated at first think because you'll pass through a number of different graphics modes before you get to where you want to be Each of hose modes will use up a different amount of memory won tit?

s this "oh dear" time? Not a bit of it

Again there's nothing to it except you have do jus, altiny bit of counting. Not a lot, and here's how it's done

We'll give a label to the place we want whatever it is to appear. Let s make it MA (for memory amount - more sophistication!) be cause it i remind us we're actually calculating the amount of memory before we get to our target position

To do this working out you're going to need the lable labelled Figure 1 in last months. MicroCompuler Printout. We've reproduced though that you get hold of the first article. I you haven a got it. We table assuming from time to lime that you're late, at with what it contained.

Right I ising the information in Figure 1. you can now work out how much me noty. you ve used in each of theid fleien, graphuis mode tines in your screen display. Start with the top one and work your way down, adding the memory used by each separate mode one untropulreach the actual line you want to put something on

When you get to that line stop adding memory to resitogether and count across horzoita y to your target posici. Remember how many pushic is you coin an ross, and and that figure to the total HAM you ve used coming down from the top.

Let's have an example!

New this all may have sounded a bit mudding lished plan it you its one of hose things that s harder to explain than to do, and you wor I have any problems.

Just in case though liet sitake an example Suppose the whole screen was made up of Graphics 1 mode thes. It dibe pietry borng. but I makes for a rice easy explanation. That's a

You plan is to put something on the second mode ine down in the third hor zontal postion Ox so far? Fine

We there's I mode melabove the ine you want, and turning to last month sitable we see. bytes to the end of the mode in a immediately. above the one you reliaming a

3 Strated - 2 bytes to get across to the you will will altotalotize you can see I went to a good school can I you?...

Now we resuscitate our original car cation. the one that gave us a value for the position. at the top left hand corner of the a reen a and we add 22 to it.

Guess what? That's the screet memory value for the very position we want to put a character at Great heavens, and you thought all this was hard! I foot you if wi

Theis ightly harder bit comes now.

Take a poke at it!

I hope I haven't suddenly scared you be cause halfa is relative. What we veldone. so la has be li soleday ha you've no need. to lear this next bit

Y to sect to get stuff on the screen we're. soing to have to poke it into screen memory. We now know where to poke if (1 you is pardon the expresion. There remains only the auestion of what to poke

we can I simply poke an "H" an "E" an "L another "L" and an "O" to put "HELLO" on the street. We have to poke numbers and they re not the Alari code numbers you've seen in an Appendix to your Alari manual

instead, we have to poke the number from an internal node set. Sorry, but that sithe way. 1 5

VALUE FACTOR O- 31 Add 64 to value 32- 95 Subtract 32 from value 96-127 Use value 160-223 Subtract 32 from value 160-223 Subtract 32 from value 170-225 Use value FIGURE 2: The conversion values to get screen poke figures from ATASCII codes. FIGURE 3: The conversion values to get screen poke figures from ATASCII codes. The short program in Figure 3 doesn to the poke figures from ATASCII codes. ATA Subtract 32 from value to get screen poke figures from ATASCII codes. The short program in Figure 3 doesn to the poke figures from ATASCII codes. The short program in Figure 3 doesn to the poke figures from ATASCII codes. FIGURE 3: The conversion values to get screen poke figures from ATASCII codes.	1 8 6 20 2 16 7 20 3 8 8 8 10 . 4 4 9 10 5 4 10 20 6 2 11 20 7 2 17 40 8 1 15 40 FIGURE 1! Choose your graphics mode and this table tells you how many horizontal TV scan lines occur in each mode line; the special mode byte code number used in constructing display lists; and the RAM which each mode line uses. ATARI ASCII SUBTRACTION FACTOR 0-21 Add 64 to value 22-95 Subtract 32 from value 32-95 Subtract 32 from value 180-223 Subtract 32 from value 180-224 Subtract 32 from value 180-225 Use value FIGURE 2: The conversion values to get screen poke figures from ATASCII codes. FIGURE 2: The conversion values to get screen poke figures from ATASCII codes. 10 DIM Ls(1) 11 GRAPHICS 0 12 SC=PEKK(88)*PEEK(89)*256 13 POSITION 0,0 14 PRINT "VERTICAL POSITION "; 15 INPUT VP 16 POSITION 0,0 17 PRINT "HORIZONTAL POSITION "; 18 INPUT HP 19 POSITION 0,0 20 PRINT "WHICH LETTER TO POKE "; 21 INPUT Ls which subtained as a disclaimal as domy it ocal content of the silent in and six and what you can do then before we move on to the silent you skip whose does is to get you law do spen wis and what you can do then before we move on to the silent you skip whose adeas to get you law of the position of the young of the position of the po	1 8 6 20 2 16 7 20 3 8 8 10 4 4 9 10 5 4 10 20 6 2 11 20 6 2 11 20 7 2 12 40 8 1 15 40 FIGURE 1! Choose your graphics mode and this table tells you how many horizontal TV scan lines occur in each mode line; the special mode byte code number used in constructing display lists; and the RAM which each mode line uses. ATARI ASCII SUBTRACTION FACTOR 0-21 Add 64 to value 32-95 Subtract 32 from value 96-127 Use value 180-223 Subtract 32 from value 160-223 Subtract 32 from value 160-223 Subtract 32 from value 160-223 Subtract 32 from value 178-159 Add 64 to value 180-255 Use value 180-265 Use value 180-275 Use value 180-285 Subtract 32 from value 180-85 Subtract 32 from value 180-95 Subtract 32 from value 180-9	GPAPHICS MODE NUMBER	FOR EACH MODE LINE	MODE BYTE CODE NUMBER	RAM USED FOR EACH MODE LINE
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PLAYER MISSILE GRAPHICS :-

involved in player-in ssile graphics would fill an issue or two of this magazine.

I you really want to get deep into the subject and quite a few people would – then a do suggest you get a copy of "De Re Atari

Happily it's now on sale at many of the bet fer computer shops, and there II be few Atan purchases your come to value more. In the meantime, you II be able to get an idea of whether you want to go further by testing the water with these articles.

First principles

Here's a question. Which is best reading an article about player-missle graphics, or having someone actually show you? The answer's obvious, shift?

And that's why so-called player mission graphics are themselves important. They give smooth fluid, demonstrative movement to a statis computer screen probably filled with otherwise unmoving words and figures.

Player-missile graphics aren't now used only in "shoot-em-up" space games though that's where they ong nally got their name. These days they give life to computer displays and make what's on the screen easier to understand.

We can best see the principles employed by first checking what would happen in an ordinary computer if we wanted to move some thing around on the screen

Moving things around

The screen RAM would store an object on a background and display both. To move the object the program would repeatedly have to write the background into one side of the object and write the other side of the object no the background. This would result is movement a beit rather jerky.

There's a significant problem though ATV screen has two dimensions. The RAM controlling what's on it only has one

Remember those lines which make up the screen? They re drawn by a flying spot racing across from left to right, and screen RAM is controlling whether the spot lights up (for the object) or doesn't (for the background).

Any object on the screen has height as well as width unless it's a single horizontal line and we won't bother with that!

If you think about it, this means the object memory is scattered through the background memory. Man pulating all that snit easy.

Why not? Simply because the object memory is strewn through the background memory. To move the object, the problem has to be continually calculate where its bits are and that takes time and spoils fluid motion.

The answer: P-M graphics

Like all brilliant answers to thomy problems the player-missile solution to moving things about on the screen is spectacularly simple. If screen RAM is one-dimensional your merely create a one-dimensional object.

Pardon? I thought you said we weren't going to bother about horizontal lines?

Ah, we did Though our object we appear to be two-dimensional on the screen it it only be one-dimensional in screen RAM

It if be in RAM in a table which is either 128 in 256 bytes long, according to whether you want a shorter fatter object or a taller thinner

Only part of the table will be the object, the rest will be background. The whole table is put on the screen as a vertical band going from the top of the screen to the botton.

We can them move the object back and lorth inside the table and also move the whole table around on the screen. There be virtually no calculation of where the bits of our object are in screen RAM – we'll always know they re totally enclosed in the table!

And you can have four!

its at this stage the Atarimagic really starts to work, for you can have up to four objects or the screen simultaneously and move each and every one guite independently of the others. Try doing that on some other computers

Not enought? Alright, we'll add completely independent colour for each object, and makes those colours independent of the background colour over which they move how's that?

want more? Well how about letting

high hobject move in front of or behind any of
the other objects according to your choice.

And while we're on the job we'll let any of
them also move "behind" the background too
if you want.

What's that? You're not satisfied? OK we'll give each of the objects some 'missiles and let each object independently control its own missile. We'll make the missiles different olours too, each matching up with its object regardless of where it goes on the screen Are you happy now?

You are? I should think so too for that panoply of possibilities is what the astonishingly simple idea of making the objectione-dimensional in memory eventually produced And an those facilities are available in both Atari home computers. All you have to do is use them.

As a last word for now...

Once again (to echo my words of last month)

Thanks for staying with me through this preamble it was necessary as you'll see next month, when we actually start programming some simple player missile graphics for our selves.

in the meantime, it would be too bad to simply leave you at this point without something to play with, so try the program in Figure 4.

- 10 GRAPHICS 0
- 11 SETCOLOR 2,0,0
- 12 A=100
- 13 B=48
- 14 R PEEK(106)-8
- 15 POKE 54279,R
- 16 P=15 *R
- 17 PORE 559.46
- 16 PORE 5 277,3
- 19 POKE 5 48,10
- 20 FOR I=P+51. TO P+64,
- 21 POKE I,0
- 22 NEXT I
- 23 FOR I=P+512+B TO P+518+B
- 24 PEAD X
- 25 POKE I.X
- 26 NEXT I
- 27 DATA 8,17,35,255,32,16,8
- 28 POKE 7(4,68
- 29 S STICK
- + IF S 15 THEN 29
- 31 IF 5 11 THEN A=A-1:POKE 53248.A
- 37 IF 5=7 THEN A=A+11POKE 53248/A
 - IF 5 13 THEN 38
- 34 FOR I=8 TO 0 STEP -1
- 35 POKE P+512+B+I,PEEK,P+511+B+I
- 36 NEXT I
- 37 B=B+1
- 38 IF 5 014 THEN 29
- 39 FOP I=0 TO 8
- 40 POKE P+511+B+I,PEEK(P+512+B+I)
- 41 NEXT I
- 42 B=B-1
- 43 GOTO 29

FIGURE 4: A very simple Basic program to produce a single object (a "player") on screen, movable with a joystick. The cursor stays in view; note the object can move over it without erasing it? Movement is slow because the program is in Basic; machine code would be much faster.

Don't expect anything too spectacular and let me stress now that it isn't a game or you'll be writing to ask how to play it it's simple a very straightforward demonstration of how to go about setting up just one object that can be moved around with a joystick

Keep it to hand though, because next month we'll be looking at how it works and how you can do the same thing (or better) too!

until then, enjoy your computing



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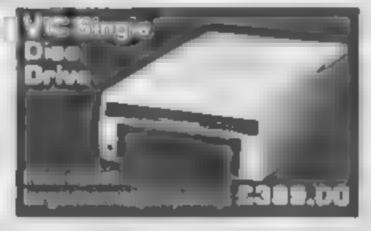
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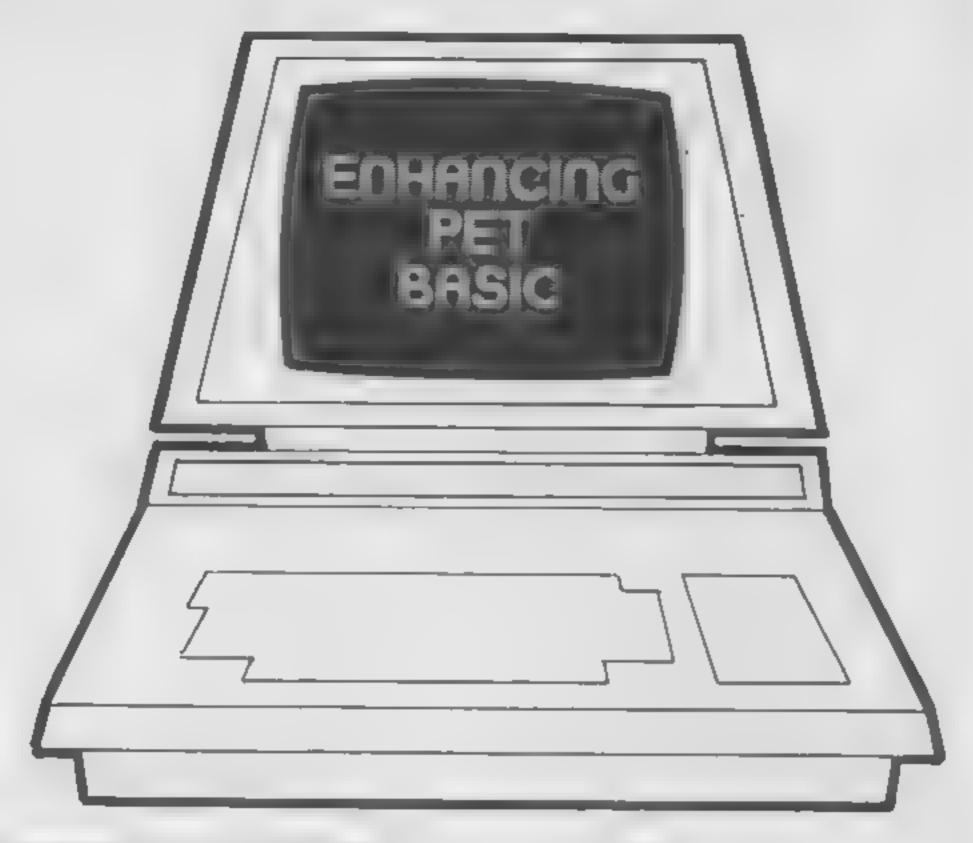
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Dave Wardill and Dave Barrett
continue their series – adding new
keywords to PET's BASIC. This month
they introduce two commands for use
in business applications, using a
single command word to replace a
whole series of subroutines.

The newcomer to file handling often has problems with planning and setting out his records. He finds that people's names are not all the same length, and he has problems knowing where to find items when he is inspecting the data he so carefully filed such a short time ago.

Wouldn't it be nice, he muses, if all the names he put in were the same length? Then he would always know where they end, and he could always pick up the next item in the record easily.

Then he probably tries to incorporate such a plan in his program, and promptly disappears under a weiter of LEFT\$ and RIGHT\$ until his program becomes so cluttered that he loses heart.

After a good nights sleep, he then probably produces a subroutine which will pad out any name he inputs - only to find a new set of problems when he accidentally puts in a name which is too long, and which irrevocably displaces the next term in his record.

He might produce code as bad as this

5000 INPUT NA\$
5010 L=LEN(NA\$)
5020 IF L<5 OR L>10 THEN ?"ERROR" GOTO

5030 NA\$=NA\$+" * 5040 NA\$=LEFT\$(NA\$ 10)

If all his strings are to have different maximum and minimum lengths, he will either have to write lots of little routines like this, or find out how to pass parameters in BASIC to a subroutine. (It sleasy enough, if a bit clumsy.)

At this point, he is yearning either for the time and expertise to master this, or for a pair of BASIC words I ke LINE INP and PADINP And here they are

Example

Let s start with a look at LINEINP Suppose that the record you are entering as data is always longer than 5 characters, but never longer than 10 LINEINP allows you to specify this and thereafter slops you from making any errors

LINEINP "ENTER NAME", 10,5,NA\$

The syntax is obvious from the example

LINEINP "message prompt"; MAX, MiN, variable name

Once you have used this, you can't enter any string less than 5 or longer than 10 characters long

Hiegal Characters

Also, it is not possible to enter any eccentric characters as part of the string. Up and down cursor movements are not accepted, nor are the REVERSE or OFF keys, the HOME or CLR keys, the RUN or STOP keys, and the colon and quote

Cursor left and right work as controls, however, and so do INSERT and DELETE

Even length

At the same time, it could be very useful to make sure that all the names that are entered are all the same length. This is invaluable when using Relative (Random) files.

The routine carled PADINP taxes care of this very nicely

PADINP "ENTER NAME", 20,5,NA\$

This will use much the same syntax as the earlier example. The maximum acceptable length is 20 characters, whilst the minimum is 5. The string is called NA\$. However, when a legitimate string is entered, its length is brought up to the maximum automatically by the addition of a bland character which will not produce any error when it is recalled later. This is character 96, one of the unused PET characters in this context. It isn't ignored or cut off in the way that a normal 'space' is although it does not show up on the screen or on a printer.

How to enter it

Once again, you can have this word as a part of the BASIC additions which we described in the June issue. If you want it as a machine code subroutine, to be entered as and when you need it then it can be typed in with the Monitor into locations \$3000-. If you want to relocate it, you will either have to enter the Assembler code and assemble it in your desired location, or use the 'New locate' function on Extramon. If you are none the wiser, give us a ring on Durham 711380 and we may be able to send you a relocated copy.

Listing

Once again, we have supplied the listing in a heavily annotated form. Just reading it through should be a help if you are beginning to tangle with machine code. We always found that we needed more documented programs to read when we began, so we hope that you find these useful. At the same time, why don't you look back at the earlier issues of *Micro-Computer Printout* which have the series on Machine Code in them? (Ed – July to December 81). It might be interesting to put the two together and work out what our program does don't you think?

Next month

medding with the chips in the PET. There is a way of recovering a part of the PET memory in ROM which can be used to store permanently any program which you regularly need. For instance, you could install DOS (UNIVERSAL WEDGE) in this space, or EXTRAMON if you do a lot of machine code writing. It would not use any of those precious spare sockets in the PET, nor would it take up any RAM. See you next month.

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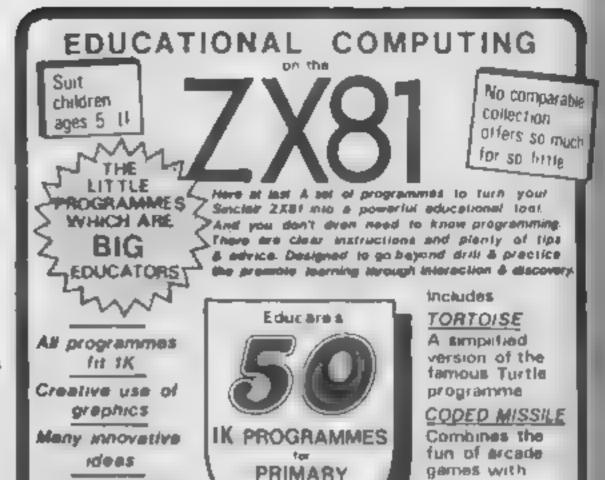
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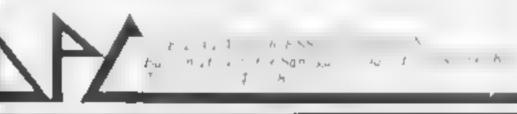


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In 1964, IBM introduced Series 360, so called on the theory that any customer could obtain a computer of the right size for his problems, and when his load went up switch to a more powerful system in the series without any change in software. The system was said to be compatible.

This was a powerful and new idea, hence the 360 as in 360 degrees

Years passed and IBM introduced the 370 series, which cynics in the company promptly dubbed as covering all directions plus ten degrees.

Naming computers can be fraught with problems. The reason more usually has to do with the fact that the computer business is international, and that a carefully elected name which has one connotation in the original manufacturer's language may have other connotations in other languages.

Nobody has been as badly caught over this as Fujitsu were to be when they initially announced their FACOM

range of computers. The name you might think is suitably innocuous. Not so I all depends on the pronunc at on

At announcement time the spokesman pronounced FACOM to rhyme with Fifther Attenting 5h speaking Japanese present pointed out that this pronunc at on had unintended overtones

There was hurried consultation, and Mr Spokesman got up again. This time he taiked of the Fake em range.

Having recovered from the shock, the same Japanese gent y pointed out that this would not do either. Nowadays, Fullish employees when addressing the English market tend either to talk about our range of

computers without naming them, or else speak very carefully and clearly enunciate the name. Falas in faliacy and comias in competition.

All that this proves, of course, is that words can be an endiess source of confusion, and no more so than in computing, for as every reader will know the computer is a iteral beast. Talk to it about elbow bending and it will think that the subject under discussion is bending elbows.

Translation by computer has been a goal of the computer community for over a quarter of a century, and much money and effort has been expended. And naturally mistakes have abounded. Most of the stories are apocryphal, among them that of the computer which faced.

with the Russian words for hydrau ic ram translated them as watery sheep. And then there was the system which translated "The spirit is willing, but the flesh is weak" as "The wine is agreeable, but the meat is lousy"

However, in computer translation, as in most things, truth is as ever stranger than fiction. Much of the early computer translation effort had its origins in the US defence programme and the need to find a rapid way of translating. Russian literature and periodicals rapidly.

In the early sixties, the Rome Air Defence Centre of the US Air Force came across the name Ava Gardner in a Russ an paper. It looked for its nearest Russ an equivalent, being unable to find an exact match in its English thesaurus, and came up with Ava Burning Bottom.

And white we are on the subject of language id diyou ever see the cartoon (t have lost the reference so I cannot properly attribute this is) of the two US Generals down in the nuclear war centre at Colorado Springs

Outside, a nuclear explosion is going off his de the two generals are poring over a print out and one is saying to the other "That's not what it says here."

And while we are on the subject of words it's back to the Bible fime.

There is an appropriate biblical tag for a most anything that is common par ance in computing. You don't believe me? Then how about the following.

Project proposal: Your old men shall dream dreams, your young men shall see visions *Joel 2 28*

Feasability study. Yet what I shall choose woll not, for I am straight betwin two. Philippians 1,22,23

System specification

For which of you sitteth not

down first and countein the cost, whether he have sufficient to finish it? St. Luke 14.28

System audit: Sure y thou has great y deceived this people. Acts 7.41

System design: And the rain descended and the floods came and the winds biew and beat upon that house and it fell not for it was founded on a rock. St. Matthew 7.25.

Implementation. And there shall be a time of trouble such as never was Daniel 12.1

As for the staff's Christmas bonus – you should be so lucky –

Then I looked on all the works that my hand had wrought and on the labour that I had aboured to do and there was no profit under the sun Ecclesiastes 2:11





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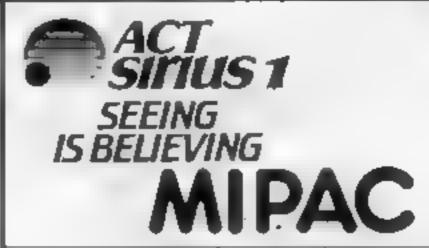
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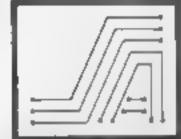


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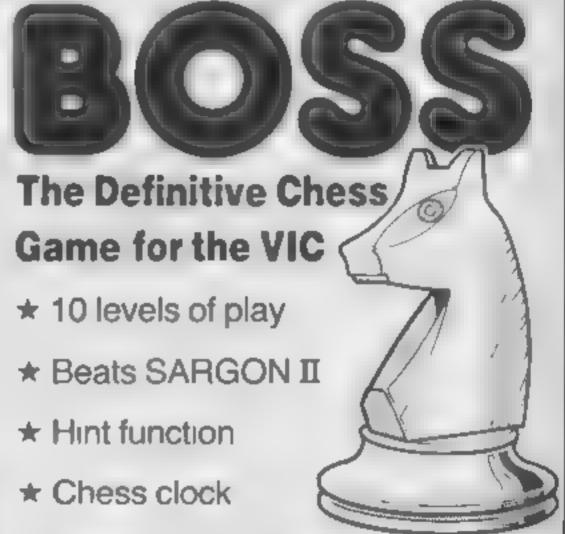
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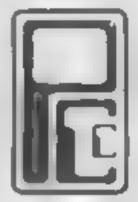
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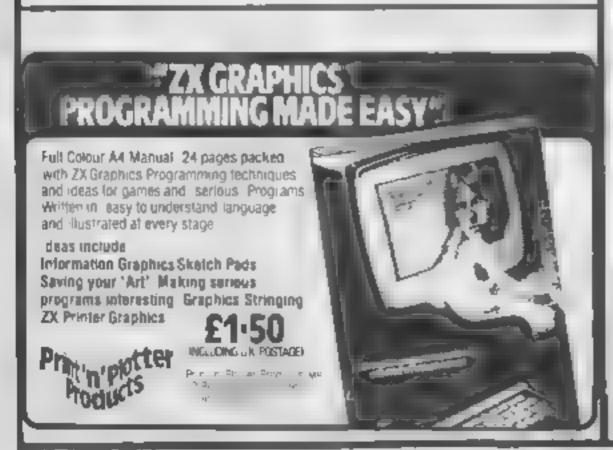
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421 READ/ WRITE

exists only in the Marketing Manager's imag nation, as seems to be the case with the BBC Micro

> Calum Steen Heiensburgh

Regrettably this is only one of the many complaints we have received regarding the long delays on the BBC Model B - and undoub tedly there is little we can do about it, except perhaps publish Mr. Steen's letter as a warn. ing to potential buyers

We did pass on a copy to Acom, in the hope that they could clarify the situation. The following reply comes from John Coll-Manager - Educational Services" and we leave readers to draw their own conclusions

"We share the frustration expressed by Mr. Steen. Model As are currently produced by Cleartone and to date about 10 000 have been shipped and we are fully up to date with orders

Model B's are unfortunately another story ICL are responsible for their manufacture and we have been quite unable to encourage them to ship the agreed volume. In practice we have received about 700 per week though a figure above this was achieved once during April. We have had repeated as surances that production would be in creased but have come to reause that it is necessary to look eisewhere for extra volume in view of the enormous number of orders we hold. We have now contracted RACE Elecfronics as an additional UK source. Cleartone have been taken over by AB Electronics and it is clear that AB intend to increase throughput at the first opportunity

Nothing would please us more than to be able to deliver computers in adequate volume and actually to start promoting the machine in the UK. Mr Steen will be aware that we have not advertised the machine since last September. We very much hope that we will be able to achieve adequate voi ume from UK sources "

The Editor welcomes your letters, but if you require a personal reply please enclose an S.A.E.



TOMMY'S TIPS

the record if you have a so used the B parameter), the DOS transfers the data to the disk. Now one reason why the DOS cannot pick up the record length from the length of the string you send to it is that you do not have to write a complete record. The purpose of the B parameter is to allow you to position the DOS pointer to the middle of a record. For example, the record in ght have a field in the middle which holds a date of some sort, and that is all you want to modify. Now you do not want to waste time reading the whole record into BASIC, modifying the field using LEFT\$ and MID\$, and rewriting the whole record, when all you have to do is write the new field to the middle of a record using the B parameter

What happens when things go wrong? Well if the record length you specified in the OPEN command was not the same as that used when the file was created, all kinds of things can happen DOS will use the ength you gave it to work out where the record it wants starts, but this will probably be in the middle of a record on the disk! The problem now ites in the INPUT statement, which will give up when it finds a carriage return character. What will happen is that the INPUT statement will only read part of the record from where DOS thinks the record starts up to the next carriage return, so that you end up with a short record. On the other hand, if you are writing to the disk, all the data in your print statement will be transferred, so that you will overwrite the start of the next record on disk



428 HOTLINE

SINCLAIR REGISTER

Pily the poor Editor Apart from the distressing state of his biceps. and his shoes (he's working on the former, we have started a fund for the latter), he has to answer all your letters

So we'll do him a favour by plugging the ZXXV81 Register at classified list of programs, hardware sources, ZX publications and User Clubs for the Sinclair

system. It should answer alreasonable questions on the subject

The Register costs £2 95 from its improbably named publishers British Heritage Ph latelies, who reside, with their large stamp collection, at 2 Woodland Way, Gosfield Halstead Essex

I will keep you posted on the Editorial biceptual situation

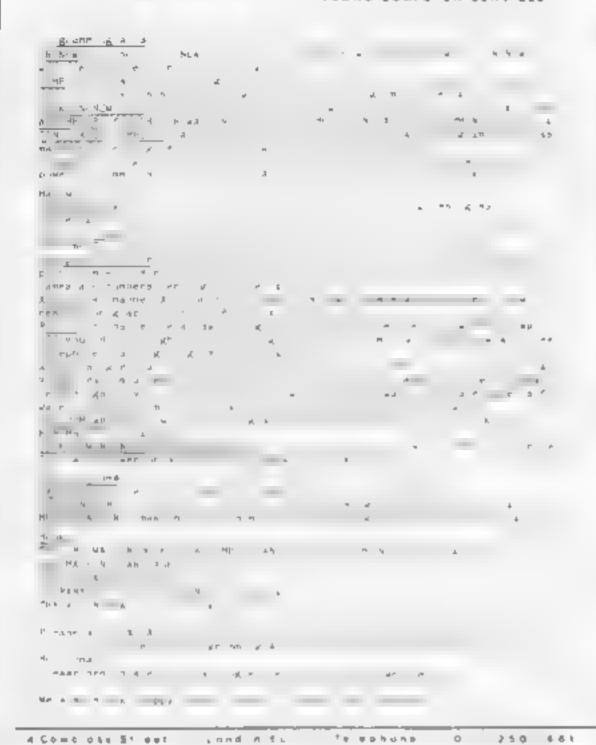


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For those suffering from severe soccer withdrawal symptoms as a result of the World Cup being over and the new season not yet arrived, this program may go some way to alleviate the distress. It is a small database of the various glories that soccer clubs have achieved and will allow you to wallow in nostalgia, look forward in hope or simply win a pint over a bet.

Data for seasons stretching from 1889 to 1982 is held covering the FA Cup final stall League Cup finalists. Division 1 League Champions, and the highest position reached by each club currently in the four divisions. Regretfully lack of space and time has precluded me from including Scottish teams but it is a matter that you can easily all tend to, given the information contained in this article.

Team information can be obtained for each or all of the above 'honours' and isted by team or season. The data is held in these for mats. FA Cup and

League Cup: YYSSRR where YY is the 2d g I year number (e.g. 81 indicates 1980-81 ind

Div. 1 winner: YY where YY is the year number as above

Highest position: YYDPP where YY is the year number as above D is the Civis in 15 sold Divid North 6 sold Divid North 6 sold Divid North PP is the position reached. Where a club has reached this position more than or the only the most recent is recorded.

By Bob Chappell

The data for the cups and championship is the dias continuous strings of 6 digit multiples (there is only a single entry for highest position data). Thus, for each team, the data is held as follows.

Team name, FA cup data, League cup data. Div. 1 data, highest position data

Where there has been no achievement in a category by a particular club, the data is signified by a single asterisk. The program does all the unpacking and places the data into the correct array elements.

All the data is read in at the beginning of the

program and the name of the team currently. being processed is flashed on the screen as an indication that the program is setting up the information. At this time, the program uses an inverted 1 st technique. In order to access speed by the data by year as well as team and category a mechanism of determining which teams were involved in a par ticular year is needed. This could be at complished by simply searching through every team's data for the year in question but this would be rather slow instead, the team data is searched at the beginning of the program and for every year item encountered an entry is made in a year array which points back to that team. Thus, item 2 in the year array is for 1901 (elements 1-83 hold years 1900-1982 and elements 90-100 hold years 1889-1899 respectively.

in each year element it string is built up of pointers back to the appropriate team data. For example, the data in year element 1 contains 031674, these are pointers to leams 03 (Astori Vicas), 16 (Bury), and 74 (South ampton). So instead of having to search (brough every team for an event in the season 1899-1900, we can just examine this element in the year array, which in turn less us to look only at Astori Villa, Bury and Southampton.

array or no corresponding entry in the year array or no corresponding entry for the category we are searching, then this means that that event was not held that year (in the case of the League Cuplithe message is displayed that it had not been instituted at that time

When searching by team, there is no need to enter the fun name of the team, just enough characters to make it unique. For example, if you wish to display Liverpool's achievements, entering LIV is sufficient. However

you must be careful – entering LI only will match against LINCOLN and the program will display their results as they are stored higher in the array than Liverpool. Similarly, L will produce the results for Leeds. Examine the list of names in the program, particularly those for Queen's Park Rangers and Nottingham Forest.

As far as I know, all the data is correct – if you have any difficulties, please first check that the data has been typed in correctly. If you disagree with any of the facts, please write to me care of the Editor.

(Ed - MicroComputer Printout does not undertake responsibility to reimburse expenses, medical or otherwise, resulting from errors in this program!)

For those of our readers not suffering severe soccer withdrawal symptoms, the program listing and documentation should at least provide an insight into some interesting techniques for handling lists of data.

Major Routines

utiries
Menu of options
Select by year - line 135 is start
of year loop
Display FA Cup results by year
" League Cup results by year
Championships by year
* Highest Position - line 405
is end of year loop
Subroutine to convert 1 into 1st
2 into 2nd, etc
Obtain & search for learn name
Display FA Cup results by team
" League Cup results by team
" Championships by team
" Highest position by team
Read in data and create inverted
yearlist.
Team data.
Delay routine
Pause routine

Major Variables

1\$(92.5)	Team array – for each of 92
	teams contains FA Cup, League
	Cup, Div. 1 winner and highest
	position data.
TY\$(100)	Year array containing pointers t
	team array
SY & SYS	Start of year range requested
TNS	Team name extracted
HS & AS	"Home" team and rival team's
	score
RT	Pointer to rival team
TN	Pointer to "home" team
N	Number of option selected

Reverse heart is Clear screen Reverse R is reverse on Reverse S is Home cursor

Program occupies about 11.5K, and was originally written to run on a PET, but can easily be converted



5 ren ***football honoura*** 10 rem ***bob chappell 28/5/82*** 15 goto665 20 ren **menus** 25 printhds:print:print:print:print" 1. fa cup final results. 30 print:print" 2. league oup final results." 35 print:print" 3. league champions.":print:print" 4. highest position."
40 print:print" 5. all the above." 45 print:print:input"which number";n\$:n=int(val(n\$)) 50 Ifnfnform>5therprirt:print"invalid entry.":gosub1260:goto25
forint"C access:=":print:print:print:print:print" 1. by year." 60 print:print" 2. by team." 65 print:print:input"which number";p\$:pwint(val(p\$)) 70 ifp<forp>2thenprint:print"invalid entry.":gosub12f0:goto95 75 print "C":print:print:ifp=2goto465 80 rem ***obtain year range *** 85 print "starting year (enter 4 digits). ":print 90 input "season ended in year"; sy\$:sy=int(val(sy\$)) 95 if sy<1889orsy>1982thenprint:print"not in my records.":gosub1260:goto75 100 print:print"finishing year (enter 4 digits).":print 105 input"season ended in year":ey\$:ey=int(val(ey\$)) 110 if my<1889 orey>1982 themprint:print not in my records. ":gosub1260:goto75 115 if sysDeySthenprint:print "invalid entry.":gosub1260:goto75 120 rem ***fa cup finals by year*** 126 Ayeval(right\$(sy\$,2))teyeval(right\$(ey\$,2)) 130 sysval(my8)-val(my8)+1 135 y=wal(sys)-2: j=sy:for j%=1toty:y=y*1: j=j*1:if j>100then j=j=100 140 tnb=tys(j):y1=y+1:y5="R"*str5(y)+" ="*str5(y1)*" ":print"C";y5 145 orangoto 150, 225, 300, 360, 150 150 m=0:print:print"R fa cup final ":print:iftn%=""goto210 155 for No Itolen(tn:)step2 100 tn=val(mid\$(tn\$, 17,2)):t3*t\$(tn,1):c\$*t\$(tn,2) 165 1fc@=""moto205 170 for 12- itolen(of)step6:t leval(mid\$(of, 12,2)) FIS Lft No.j-1gpto200 180 /moval(mid\$(o\$, 32+2, 1));aseval(mid\$(o\$, 32+3, 1)) 185 inscargoto20 192 rt=val(mid\$(d\$, 52+4,2)) 190 mal:printt8;ha:t8(rt,1);aa:j0xlen(o\$):j1xlen(tn8) JOS NEXT 32 205 next_11 210 LFmsOthenprint'no fa cup this sesson." 215 rem ***League cup finals by year*** 239 L/h: Igoto405 335 m=0:print:print"R league oup final ":print:1ftn\$=""goto285 230 for] haltolen(tn#)step2 # the wal (mids(ths, j1,2)):tsets(th,1):osats(th,3) ONO lifeta "#"goso28 For 12: Stolen(os) step5:tlaval(mids(os, 52,2)) 250 IN10-1-1goto27 35 he-val(mid\$(o\$, 32.2, T)) tameval(mid\$(o\$, 52.3, 1)) THIS LETTH-CHARGOTON 75 Pt-val(mid#(o\$, 12.4,2)) #70 sat:printt\$(ha;t\$(rt,1);an:j0:len(o\$):j1:len(th\$) 275 MAKE SE 780 Next 11 285 LTH-Othenprint"the League oup had not been instituted." 290 rem ***div 1 onempions by year*** 295 kFb+3(01c405 #00 m=0:print:print"% league champions ":print:iftn1=""goto345 305 for jixitolen(tn#)step2 310 tn=val(mid\$(tn\$, j1,2)):t\$=t\$(tn,1):os=t\$(tn,4) 315 1fc%="#"goto340 320 for jas itolen(os)step2:tieval(mids(os, j2,2)) 325 ift10j-1goto335 330 z=1:printt\$:j2slen(u\$):j1slen(tn\$) 335 mext 52 340 next_j1 345 ifz=Othenprint"no championships this season." 350 rem *** best position *** 355 Lfn=3goto405 360 z=0:print:print"% best position ever "iprint:iftn%;""goto400 365 ls="":forj1=ltolen(tn3)step2 370 tn:val(mid\$(tn\$,j1,2)):t\$st\$(tn,)):c\$st\$(tn,5) 375 t1=val(mid\$(c\$,1,2)):1ft10-j=1goto395 380 Afts=15goto395 385 mm1:15=t6:printt6;" finished ";:gosub415 390 printp6;" in div.";d8 395 next 11 400 ifz=Othenprint hothing for this season." 405 wosub1265 mext 34:goto25 410 rem ***position subroutine *** 415 plemid\$(c8,4,2):1fp8<"10"thenp1=right\$(p8,1) 420 d\$=mid\$(c\$,3,1):d=val(d\$) 425 ifrights(ps,1)="1"andpsO"11"thenps=ps+"st":goto445 430 ifrights(ps,1)="2"andpsO"12"thenps=ps+"nd":goto445 435 [frights(ps,1)="3"andpsO"13"thenps:ps+"rd"1goto445 440 paupse"th" 945 ifd=5thend(="3n" 450 ifd=6thend3="3a" 455 return 460 rem ***obtain team name*** #65 print:print"type * to obtain all teams. ":print:print:zz=0 470 input "the team is";a\$:l=len(a\$)
475 print:print:ifa\$="enthenfor]3=ltott:zz=j3:gosub495:next]3:goto-5 480 for j=1tott:ifas=left\$(t\$(j,1),1)thenzz=j:j=tt #65 next:if mr=Othenprint "I have no record for that team.":gosub1260:goto25 490 gosub-95:goto25 495 print"C";:1fn=lorn=5thengosub525 500 ifn=2orn=5thengosub585 505 1fh=3orn=5thergosub610 510 ifn=4arn=5thengasub645 515 gosub1265:return 520 rem ***fa cup finals by team*** 525 print"R fa oup final - ";t\$(zz,1);" ":a\$=t\$(zz,2) 530 ifat: "*"thenprint:print"they have never reached the final. ":goto540 535 gosub545 540 print:return 545 print:forj=1tolen(a%)step6:y=val(mid%(a%, J,Z))+1900 550 1fy>1983theny=y=100 555 hs:val(mid\$(a\$,j+2,1)):as:val(mid\$(a\$,j+3,1)):rt:val(mid\$(a\$,j+4,2)). 560 as:val(mid\$(a\$,j+3,1)):rt:val(mid\$(a\$,j+4,2))



565 printy-1;"-";y;:ifha:wanthemprint"bent ";:goto575-570 print"lost to "; 575 printt\$(rt,1);ha;aa:mext:return 580 rem ***league cup finals by Leam***
585 print"R league cup final - ";t\$(xx,1);" "taint\$(xx,3) 590 lfa%:"*"thenprint:print"they have never reached the final, ":goto600 595 gomub545 600 print:return 605 rem ***league champions by team***
610 print"R league champions = ";t\$(zz,1);" ":print:af=t\$(zz,4):z=0 615 if a 8 = ""thenprint "they have never won it, "treturn 620 l=len(as):forj=!tolatep2:y=val(mid8(as,j,2))+1900:z=z+1 625 1fy>1983theny*y=100 630 printy-1;"-";y;:ifz=3thenz=0:print 635 next (print (return 640 rem ***best position by temm*** 645 print:print" best position ever - "it5(zz,1);" ":print:c#=t\$(zz,5) 650 gosub#15(yevsi(mid\$(o\$,1,2))=1900:ify>1983thenysy=100 655 printy=1;"=";y;" Finished ";p\$;" in div.";d8:ceturn 060 rem **initialise ** 665 hd84"C R football honours 1889 - 1982 "sprinthd\$ 670 print:print:print:print"please wait while I set up the data. 675 ty=100:tt=92:dimt&(tt,5),ty&(ty) 680 forjeltott:readt#(j,1).t#(j,2).t#(j,3).t#(j,4).t#(j,5):newt 685 forjeltott:print*C":print:print:printt#(j,1) 690 [\$=mid\$(str\$(j),2):iflen(j\$)<2then)\$="0"+j\$ 995 For 11+2103tc4+t4(j,j1):1fc4+"*"goto710 TOO for Jan Helen (e3) slep6: a val(mid3(c3, j2, 2)) +1 705 ty8(a)=ty8(a)+j8:nex6.)2 750 newbjirelet#(j,4):1Fcd="*"goto725 755 Forj):1bolen(0})step2:a=val(mid#(c#,j1,2)):1 TRO ty8(a)=5y8(a)+j8:nex5j1 725 asval(left#(t#(5,5),2))+1 730 tyš(a)=5yš(a)=j\$:news.jigotos5 735 Pm**Leam data** 740 datasidershot, *, *, 74300 750 data270118302039321252361071502045520152712145720142780141793248800187 755 maEa680142691380,3133343538485371,71101 760 Autaanton Villa,920386951086973231052052131078201039240252572148 765 data613269631305710282751055773231,94969799001081,61101
770 databarnoley,100252122086,*,*,15203
775 databirmingham,3112865613W7,633103,*,56106
780 datablackburn,906172913157283139600390,*,1214,18101 785 datablackpool, 482448510252534308, *, *, 51103 790 databolton,941457040147232087261047292063533407562048, *.*.21103 790 databolton,9*1*570*01*72320872810*7292063533
795 databournemouth,*,*,*,72303
800 databradford,111052,*,*,11105
805 databrentford,*,*,36105
810 databristol mity,0901*8,*,*,07102
820 databristol mity,0901*8,*,*,07102
820 databristol rovers,*,*,59206
825 databurnley,1410*5470120821382,*,2160,80101
830 databristol rovers,*,*,59206 830 databury,004074036029,*,*,26104 835 datacambridge,*,*,80208 840 datacardIff,250171271002,*,*,24102 840 datacardiff,250171271002,*,*,24102 845 datacarlisle,*,*,*,75122 850 datacharlton,461429471015,*,*,37102 855 datachelmea,150371671282702142,653243721277,55,55101 860 datachester,*,*,36502 865 datachesterfield,*,*,47204 870 datacolchester,*,*,57603 875 datacoventry,*,*,78107 680 datacrewe,*,*,93210 585 datacrystal palace,*,*,80113 890 datadarlington,*,*,25215 895 dataderty,981356991471030616464120,*,7275,75101

910 data772303,91152832396370,70101 915 dataexeter, *, *, *, 33602 920 datafulham, 750287, *, *, 50110 925 datagillingham, *, *, *, 79304 930 datagrimsby, *, *, *, 35105 935 databalifax, *, *, *, 71303 940 databartlepool, *, *, 57502 945 databareford, *, *, 77222 950 datahuddersfield,200103221065284308300202380165, 249598,26101 955 databull, *, *, *, 10203 960 dataIpswich, 781002, *, 62, 62101 965 dataleeds,651245701221721002730178,681002,6974,74101 970 dataledoster,491390610262631348690147,644377652321,*,29102
975 datalincoln,*,*,*,02205
980 dataliverpool,140115500202652142711202743052771248,780156812187823182
985 data01062223476466737677798082,82101
990 dataluton,591256,*,*,58108 995 datamanchester city,041008260108330331342163551352563105691043812388 1000 data702186741290762152,3768,68101 1005 datamanchester utd.091013484207571203580208633143760174772145792302;*
1010 data08115256576567,67101
1015 datamansfield, *.*, *,78222
1020 datamiddlesbro, *,*, *,39104
1025 datamillwall, *,*, *,72203 1030 datamewcastle 1035 deta050203060131081390102004110110242003322102512007521002553147740345 1040 data761247,05070927,27101 10%5 datamewport, *, *, *, *, *7.222 1050 datamorthampton, *, *, *, 66121 1055 datamorthampton, *, 6240687 30182750103, *, 80112 1060 datamortha forest, 983129592146, 781045793274800190, 78, 78101 1085 dstarotts sounty,911306984108,*,*,91103 1070 dstaoldham,*,*,*,15102 1075 dstaorient,*,*,83122 1080 dataoxford,*,*,*,73208 1085 dstapeterborough,*,*,76304 1090 dataplymouth, ", ", ", 53204 1090 dataplymouth, ", ", ", 53204
1095 dataportsmouth, 290208381247394190, ", 4950, 50101
1100 dataport vale, ", ", 31205
1105 datapreston, 893090220139371378381039542386642387, ", 8990, 90101
1110 dataport, 820182, 673286, ", 76102
1115 datareading, ", ", 27214
1120 datarochdale, ", 620455, ", 27502
1125 datarotherman, ", 612303, ", 55203
1130 datascenthorpe, ", ", 62204
1135 datascenthorpe, ", ", 62204
1136 datascenthorpe, ", ", 6204
1140 datascenthorpe, ", ", 62004 1140 datasheffield wed,901606962190072131354286662331,*,03042930,30101 1145 datashrewsbury,*,*,8,80213 1150 datasouthampton,000416021271761046,792356,*,71107 1155 datasouthend, *, *, *, 50603 1160 datastockport, *, *, *, 06210 1165 datastoke, *,643443722121, *,47104 1170 datamenderland,130103373165731042,*,929395021336,36101
1175 datamenses,*,*,*,82106
1180 datamender,*,693102,*,70205
1185 datatorquay,*,*,*,68304
1190 datatortenham,013171211090612043623115672121813247821066 1195 data712003731055821345,516%,61101 1200 datatranmere, *, *, *, 39222 1205 data-misuli, *, *, *, 99206 1210 datmentford, *, *, 8,82200 1215 datawest bros, 923003950103120204112105352472543265681031 1220 data665387672366701247,20,20101 1225 datasest lum,230208643265752033801002,663586811245,*,71106 1230 datasdgsn,*,*,*,8,82403 E235 datawincledon, *, *, *, 82321 E240 datawolves, 890365931031961272083152210182391463493143603006, 742147801056 1245 data545859,59101 1250 dataurexban, *, *, *, 79215 1255 datayerk, *, *, *, 75215 1260 for julto2000 :next creturn 1205 print:print" press space to dontlinger" 1270 getb\$:1fb\$0" "then 1270

905 dataeverton, 930190972303061052071272333047663272660186



900 datadoncaster, *, *, *, 02207

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